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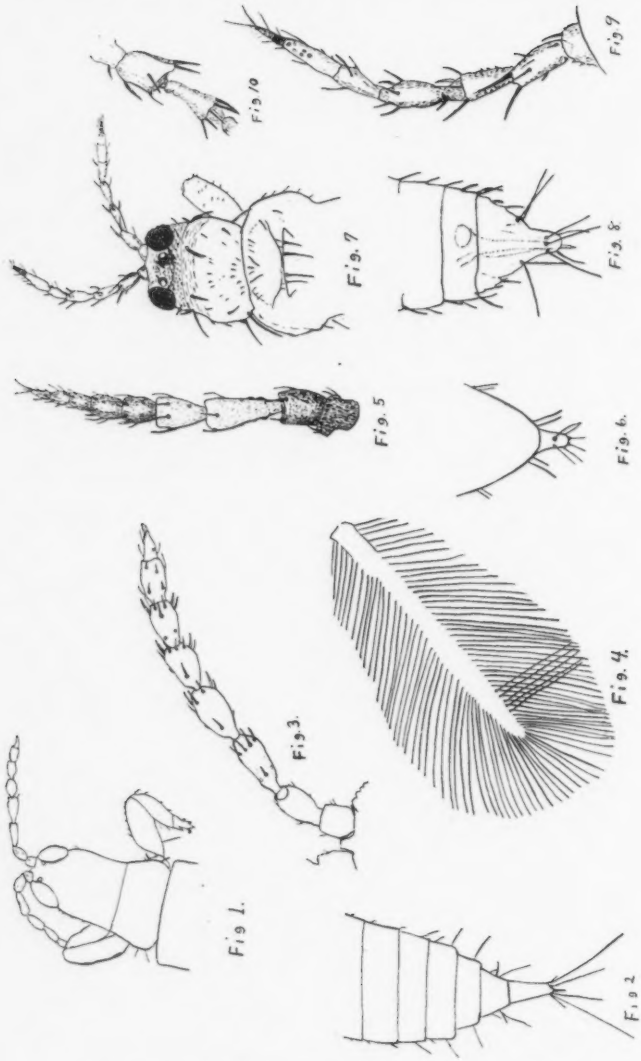

NEW THYSANOPTERA FROM FLORIDA—WATSON.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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New Thysanoptera from Florida.

By J. R. WATSON, Gainesville, Florida.

(Plate II)

The types of the new species here described are in the collection of the Florida Agricultural Experiment Station and cotypes will be placed in the U. S. National Museum.

Cryptothrips pini n. sp. (Pl. II, figs. 1-4).

General color very dark brown, almost jet black by reflected light.

♀. Total length 1.7 mm.; head .24 mm. long, .16 mm. in breadth; prothorax, length .14 mm., width .22 mm.; mesothorax, width .29 mm.; abdomen, width .31 mm.; tube, length .12 mm., width at base .069 mm.; antennae: 1, 24.3; 2, 46.6; 3, 61.4; 4, 56; 5, 47; 6, 40; 7, 41; 8, 30; total length 373 microns.

Head one and one-half times as long as broad; cheeks slightly rounded and bearing a few very weak and short spines. *Eyes* reddish brown, slightly bulging; posterior ocelli situated far forward near the anterior ends of the eyes with the inner margins of which they are contiguous. *Mouth cone* large and rounded at the apex, reaching nearly to the posterior margin of the prothorax. *Antennae* eight-segmented, one and one-half times as long as the head; segments 1 and 2 dark brown, nearly as dark as the head; 3 brownish yellow, 4 varying from yellowish brown to light brown, 5-8 light brown; hairs weak and inconspicuous, a pair of heavy cones on segments 4 and 5.

Prothorax little more than half as long as head, one and one-half times as wide as long, sides diverging posteriorly; a rather weak spine on each posterior angle; no other conspicuous spines. *Mesothorax* nearly rectangular in outline but the sides slightly converging posteriorly, anterior angles very sharp. *Metathorax* with nearly parallel sides.

Legs slender, concolorous with the body, except the tarsi which are lighter, bearing a number of short but rather stout spines. Each femur has one long spine on the anterior margin one-fourth of the distance from the proximal end; posterior tibia with one rather long spine and a stout tooth on the anterior distal end; on the middle tibia the spine is less conspicuous and on the fore tibia both spine and tooth are still less conspicuous.

Wings nearly reaching the end of the abdomen; anterior pair noticeably constricted below the middle, fringed with long hairs which are nearly together towards the end of the wing, otherwise very evenly spaced; from three to six (usually five) hairs of a double row present. Hind wings very similar and nearly as large, but no constriction or double row of hairs.

Abdomen rather long, tapering gradually from about the third somite; first three somites entirely free of spines; from the fourth on there is a short spine about two-thirds of the distance along the margin which becomes progressively longer on the posterior somites, which also bear two or three shorter spines. *Tube* rather long, sides converging to one-half the width of the base at the apex.

♂. Similar to the female except for the weaker and especially narrower abdomen. Total length 1.23 mm. Most of the measurements are from seven to fifteen per cent. less than those of the female except segments 3-8 of the antennae.

Larvae.—The very young larvae are straw yellow in color, except the last three or four somites of the abdomen which are reddish brown and the antennae which are dark brown. As the larva becomes older the entire abdomen becomes reddish brown and the thorax develops brown blotches. The eyes are dark red.

Described from numerous females and several males and larvae.

Habitat.—Among the needles of pine trees, where they are quite common. Found on both young trees and large ones which had just been felled. Gainesville, Florida, January to April, 1914.

Heterothrips aesculi, n. sp. (Pl. II, figs. 5-6).

♀. Color very dark brown, black by reflected light. Total length, .9 to 1.0 mm.; head, .06 mm. long (exposed part), .15 mm. wide; pro-

thorax, .16 mm. long and .22 mm. wide; mesothorax, .26 mm. wide; abdomen, .14 mm. wide; antennae: 1, 23; 2, 38; 3, 72; 4, 41; 5, 30; 6, 28; 7, 15; 8, 17; 9, 19 microns.

Head as in *H. salicis* Shull, but the eyes are *dark reddish brown*, projecting prominently, spines between the facets very short. *Ocelli* yellow, posterior ones contiguous with the margins of the eyes, top-shaped with the pointed end directed posteriorly. *Mouth cone* as in *H. salicis*. *Antennae*, segments 1 and 2 *considerably lighter than the body*, apex of segment 2 nearly white, segment 3 yellow crossed by two white bands below the middle and with a white apex, segment 4 varying from nearly as yellow as 3 to nearly as brown as 5-9, always *lighter at the apex* than at the base, no circle of sensoria; segments 5-9 light brown; all segments, but especially 1 and 2, show transverse markings like the reticulations of the body; *articulations* between segments 3 and 4, 8 and 9, and sometimes 7 and 8 *clear*, others brown.

Prothorax as in *H. salicis* being about twice as long as head, sides strongly convex, beset with short spines which are more conspicuous at the angles. *Mesothorax* wider than metathorax.

Fore wings reaching to tip of abdomen, costal margin bearing about 30 spines, fore vein with about 26 and hind vein with about 18 spines.

Legs as in *H. arisaemae* Hood, femora concolorous with the body except the apical third of the fore pair which are concolorous with the fore tibiae, yellowish brown. Other tibiae brown but lighter on the apical third. Tarsi brownish yellow.

♂. .75 mm. long. Other measurements from 20 to 30 per cent. less than those of the female.

Described from numerous females and several males taken from the blossoms of *Aesculus pavia* at Gainesville, Florida, in March, 1914. This species is remarkably intermediate in many of its characters between *H. salicis* and *H. arisaemae*, particularly in the lengths of the antennal segments. It has the legs colored like the latter species, but on the whole is more closely related to *H. salicis*, from which it differs in the italicized characters.

Euthrips tritici var. **projectus** n. var. (Pl. II, figs. 7-10).

♀. Size, 1.00 to 1.25 mm. *Measurements* of head and thorax as in *E. tritici*. *Antennae*: Segment 1, 27; 2, 39; 3, 53; 4, 45; 5, 32; 6, 43; 7, 8; 8, 10 microns.

Color varying from clear straw yellow without a trace of orange except at tip of abdomen (found in blossoms of yellow composites) to a deep orange on thorax and abdomen; never brownish yellow. *Shape* and spines of head and thorax as in *E. tritici*.

Antennae: Segment 1 concolorous with the head, with a long but

slender curved spine on inner anterior angle. Segment 2 light brown, very long and the dorsal portion prolonged forward over the third segment and bearing two stout spines as in var. *bispinosus* Morgan; in side view this segment is triangular in outline. Segment 3, basal two-thirds white or gray, distal third light brown, carrying four good-sized spines as do all the other segments except 7; 4, basal half yellow, distal brown, 5 yellow, 6-8 dark brown. *Eyes* dark red, with 30-40 large facets.

♂. Similar in size to *E. tritici*. More inclined to be orange in color than the female. Differing from the species chiefly in the characters of the antennae. Segment 1, 20; 2, 34; 3, 24; 4, 37; 5, 30; 6, 40; 7, 7; 8, 9 microns. The most decided difference between this variety and the species is again found in the second segment of the antennae, which in the male, however, is markedly shorter than in the species while in the female it is longer. The projection of the second over the third segment is even more pronounced than in the female.

This variety is more closely related to var. *bispinosus* Morgan than to the species, but differs in the forward projection of the second segment and in its relative length. The spines on this segment are also different. The spines on the ventral side at the apex are much shorter than figured by Morgan and there is a stout spine near the base that he does not figure at all.

This is a very common type in Florida, being found in a great variety of blossoms, as orange, tomato, roses, begonia, numerous composites, and among the needles of tall pine trees.

Described from numerous females and males.

Cryptothrips floridensis.

The author has received what appears to be this same species from Mr. A. Rutherford, government entomologist of Ceylon. This greatly extends the range of this species. See ENTOMOLOGICAL NEWS, April, 1913.

EXPLANATION OF PLATE II.

Figs. 1-4. *Cryptothrips pini* n. sp. 1. Head and prothorax of female. 2. Posterior portion of abdomen of female. 3. Dorsal view of right antenna of female. 4. Fore wing.

Figs. 5-6. *Heterothrips aesculi* n. sp. 5. Head and thorax of female. 6. Tip of abdomen of female.

Figs. 7-10. *Euthrips tritici* var. *projectus* n. var. 7. Head and thorax of female. 8. End of abdomen of female. 9. Dorsal view of left antenna of female. 10. Side view of second and third segments of left antenna of male.

New Fragments on Some Well-known Insects (Col., Orth., Hem.).

By A. A. Girault, U. S. Nat. Mus., Washington, D. C.

The Method of Handling and Rearing Scarabaeidae of the Tropics.

The so-called white grubs of North America (larvae of *Lachnosterna* spp.) are well known to entomologists of the United States, and it is notorious that the larvae are exceedingly difficult to rear and that they require very careful handling in confinement. Indeed it may be stated that rather prolonged efforts have been made in some places to rear the insects both indoors and out, but without notable success. Recent experience with larvae of the same family (but of various genera) in North Queensland has inclined me to think that the failure to successfully handle them in North America was due rather to the spirit than to the substance, though I may be mistaken. The larvae I have in mind all feed upon the roots of various grasses and upon sugar cane. They do not differ in structure from those of *Lachnosterna* yet they are very hardy. For instance when obtaining material for the laboratory, we simply go out with a small satchel full of empty tin boxes (ordinary pipe tobacco boxes of the market) and dig around in various places with a small handpick; or else follow a plowman. The larvae obtained are placed into the boxes which are filled with soil and brought back. When convenient, say the next morning, they are transferred to pots, boxes and glasses filled with soils of various kinds and thus kept until maturity. Some remained in bare earth for months and throve, and they certainly extract nourishment from the soil like earthworms. Others are fed upon the roots of corn sprouted in the cages while others again are placed with decomposing vegetable matter upon which they thrive. Their growth is very rapid. Thus, merely handling them is impunitive. There is a big advantage, however. The life cycle is only about one year, and larval growth seems to occur the first three or four months following hatching, so that thereafter they can stand any amount of

starvation; as a matter of fact, the ground in North Queensland soon after the rainy season gets very dry so that the grubs retreat downward to surprising depths, out of reach of most roots.*

Periplaneta australasiae Fabricius in North Queensland.

Upon renting a private residence (and which had been formerly occupied by a family) in the little hamlet of Nelson, North Queensland, for a laboratory early in 1912, I found it in course of time to be badly infested with a cockroach which at first I thought must be a new form. It attracted especial attention because of the peculiar habit of depositing its egg cases against the walls, in cracks or behind objects such as books and coating over the sac with a layer of mud. I have never observed this before, nor remember having seen it recorded in the literature, and the fact at once became interesting. In a bookcase composed of wooden shelves, this roach was common, hiding behind the books and feeding upon the bindings, denuding in many cases all of the gold lettering on some of the bindings and in others giving an effect like that which would result from soaking in water. Upon first noticing the injury, in fact, I had almost unconsciously attributed it to rain having been allowed to beat through a transom, but upon removing some of the books, the presence of the insects was discovered; their excrement was very abundant between the books and the back of the shelf. The eggsac may be deposited upon the verandah or upon boxes on the ground beneath it. Two sacs taken on August 23 and 27, 1912, were separately kept in vials corked tightly and kept dry; each was completely covered over with a thin coating of reddish mud and measured between a half and three-quarters of an inch long; the sacs when uncovered have a characteristic satiny appearance, due

[*Some results of Mr. Girault's rearings of Australian Scarabaeidae are contained in his article "The Probable Best Method of Rearing Certain Scarabaeid larvae," Journal of Economic Entomology, VII, pp. 445-447. December, 1914. —Ed.]

to the shiny black color and fine longitudinal striation. Hatching occurred after several days, the young being characteristic in appearance. They are black with two adjacent white stripes across the middle of the body; closer inspection shows also that the femora are white and the sides of the prothorax while the two white stripes across the thorax are on the last two thoracic segments which are white, margined with black behind. Since no other roach is present, it is taken to be highly probable that these young and the sacs are *australasiae*. I do not remember ever having seen the sacs of woodland species coated over with mud, and this case appears to be altogether exceptional. Later, other egg cases not striated but opaque and reddish brown, similarly deposited but uncoated were found, and these appear to be *australasiae* since I obtained a similar sac from a female of that species in a hotel at Nelson.

Still later on May 2, I found a number of the sacs, some coated over with mud, some not; both the smooth and striated ones were found under both conditions. In a groove running down the center of a crosspiece on the door of a basement room in the laboratory, a sac of *australasiae* was found which was covered over (but only partly concealed) with minute bits of wood glued to the sac and which had been chewed from the sharp edges of the groove, as was plainly evident by the marks of the mandibles; the sac then resembles the surface of any wet or sticky object which has been sprinkled over with finely divided straw. The sacs, at least when coated with mud, are usually found against or upon the nests of muddaubers', so that resembling very closely one of the daubs of mud which these wasps use to cover over their cells, they are very well hidden indeed.*

The Occurrence of Cimex lectularius Linnaeus in Queensland.

On January 17, 1913, I found in the mattress of a bed in a hotel at Townsville, three specimens of a *Cimex* which upon comparison with specimens of *lectularius* from North America

*The sacs of *australasiae* have also been found to be deposited commonly into boxes of earth, to depths of one inch or more.

were seen to be identical. Since my arrival in Queensland late in 1911, this is the first time that this species has been met with, though my experience with all classes of hotels over the state (not to mention many coastal steamers) has been rather extensive (Brisbane, Roma, Mackay, Finch-Hatton, Townsville, Charters Towers, Ayr, Bowen, Proserpine, Lucinda Point, Ingham, Seymour, Halifax, Innisfail, Cairns, Nelson, Hambledon Junction, Babinda, Double Island, Herberton, Yungaburra, Malanda, Mareeba, Aloomba, Kuranda, Cooktown, Port Douglas, Mossman, Thursday Is., Cape River (farm house) and Hughenden). I have been to but one hotel in Brisbane, one in Mackay, but to about four or five in Townsville; in the former two places the hotels were of the first class while none of those in Townsville were poor, and only the few specimens met with were seen in the poorest of the four, the one which was cheapest, less well constructed, managed and so on and catering more to families than to transients. Thus, I have thus far met with the species only in large towns while the poorer hotels of the hamlets and settlements seemed to be free of them.

Miscellaneous Notes on Odonata.

By Mary B. Lyon,

With Comments on the Dimorphism of the Females of Ischnura verticalis,

By Philip P. Calvert.

Miscellaneous Notes on Odonata by Mary B. Lyon.*

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In the course of an ecological study of the dragonfly nymphs of Cascadilla Creek, made at Cornell University in 1912-13, the results of which were published in the News for January, 1915, some observations on Odonata were made,

* Contribution from the Limnological Laboratory of the Department of Entomology, Cornell University.

which fell outside the scope of that work. These are here brought together and a description of the nymph of *Enallagma ebrium* Hagen is included.

I. A Note on the Emergence of Gomphines.

At the southern border of the Cornell University campus, a small stream known as Cascadilla Creek divides into two branches. After running through a grassy meadow these two branches again unite to form Dwyer's Pond. During the summer the upper third of one branch dries up, making a pond of the remainder of it. The other branch becomes a slow, sluggish stream. These quiet waters with their beds of soft mud and sand make an ideal home for the Gomphine nymphs which live there in great abundance. How great I did not realize until the morning of May 7, 1913, when the unusual number of birds along the banks attracted my attention as I came into the meadow. When I walked over to look I saw a great many Gomphine exuviae and closer examination showed many glistening wings among them. Along the banks of the stream and pond as far as six feet away from the water the ground was strewn with them. In a typical region I counted twenty-seven cast skins in a space only two feet square. Not a *Gomphus* was seen on the wing nor were any observed for several days afterward. The sandpipers, bronzed grackles, red-winged blackbirds, sparrows and probably other birds had enjoyed a sumptuous feast, as this was evidently the one morning of the season which hundreds of Gomphines had chosen for their emergence.

II. The Nymph of Enallagma ebrium Hagen. Notes and Description.

In addition to the dense population of burrowing nymphs in this part of Cascadilla Creek there is another one composed chiefly of damselfly nymphs, which inhabits the waterweeds. One of the most numerous species of this group is *Enallagma ebrium* Hagen. Some of these nymphs taken into the laboratory and reared in a cylindrical wire gauze cage (Needham

'99) emerged June 20. Imagos appeared in the field a few days later and were common until July 30, although by July 4 the season of transformation was practically over. As is the custom of other Enallagmas, the male usually accompanied the female during oviposition. I saw only one female descend beneath the surface of the water. She was deserted by the male, who hovered over the water in an agitated manner for ten minutes. He flew to the shore, but returned again to remain twenty minutes longer above the spot where she had disappeared. On July 16 a pair was copulating on the Alumni Field about an eighth of a mile from Cascadilla Creek, the nearest body of water from which they could have emerged.

*Description of Nymph.** (Plate I, fig. 3, text figs. 1-4).—The nymph of *Enallagma ebrium* Hagen appears more active than that of other species of *Enallagma*. Even at transformation time the color is such a clear green that the nymph looks as though it had recently molted, but a very slight pigmentation sometimes darkens the shade.

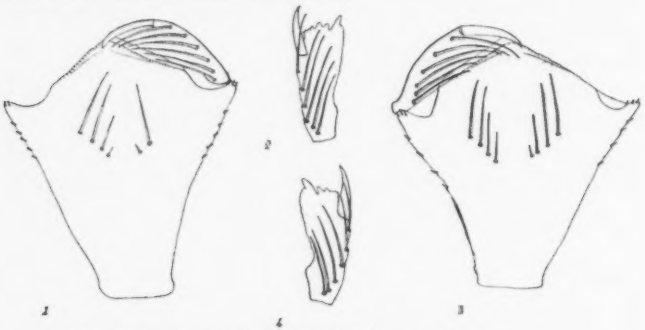

FIG. 1.—Labium showing the usual number of mental setae.
" 2.—Lateral lobe of labium shown in Fig. 1.
" 3 and 4.—Labium and lateral lobe showing the extra number of setae.

[*The nymph of *E. ebrium* has been described from a single specimen by Dr. E. M. Walker (Can. Ent. xlvi, p. 351, Oct., 1914) some months after the receipt of Miss Lyon's MS. by the NEWS. Since Miss Lyon had a greater number of individuals at hand in drawing up her description and has accompanied it with figures, we publish her account as received. Plate I was published in the January number of the NEWS.—ED.]

Labium with hinge halfway between first and second pairs of legs. Mental setae variable in number, usually four on one side, two on the other. Inner seta of the four reduced to a mere spinule, as in the corresponding one of the two, while the one next to it may be nearly one-third shorter than the normal. Labium occasionally with four mentals, two of which are reduced in size, especially on one side. Lateral setae six. Lateral lobe with three distinct teeth above the end hook, preceded by three minute teeth between which project two spinules. Femora with dark subapical rings. Tibiae with dark basal ring. Gills lanceolate; widest just beyond the middle, with blunt tips; proximal half of their ventral margins straight and strongly spinulose; the dorsal margin slightly convex, somewhat spinulose; distal margin bearing a few long hairs. Gills hyaline with four or five wide, dark, lacey bands formed by pigment covering the tracheal tubes.

Dimensions.——Body 12-13 mm.; gills 5.5 mm. additional.

III. The Supposed Dimorphic Female of Ischnura verticalis Say.

The dimorphism of the female of various species of *Ischnura* has been generally accepted, two forms having been described as the orange and black females of *Ischnura verticalis* Say in the keys of Calvert ('93), Williamson ('00), and others. According to Williamson, both become pruinose, the black female less so than the orange. He also notes that the pruinose orange females are more numerous in the spring than the bright orange or black ones, while the black females are most numerous in the autumn. Since it seemed probable that these three forms might be different stages in coloration due to age, some experiments were undertaken to determine their relationship if possible. The results have proved that there is but one female for *Ischnura verticalis* Say.

Apparatus.—The banks of Cascadilla Pond are straight and grass-grown. Into one of these banks a cut was made so that about ten inches of water might run into the bay thus formed. A simple cage was built to cover this bay together with a bit of the bank. The framework was made by crossing two pieces of heavy wire to form the diagonals of this rectangular space. The wires were bent at the corners so that when placed firmly in the ground they made a framework ten inches high. Over this support a covering of white mosquito netting

was stretched, and above that a layer of cheese-cloth. The edges of both were fastened by stones firmly to the ground on three sides, that of the fourth being held down by the weight of the water into which it extended. A natural habitat was thus secured with grass, water, plenty of room for flight, and sunlight a part of the day.

Experiment.

4 p. m., July 11. Eight orange females and four males of *Ischnura verticalis* Say which had emerged in the laboratory July 9 and 10 were placed in the cage. The length of the abdomen of the females was noticeably different and when measured was found to vary from 20.5 mm. to 23 mm., the hind wing varying in length correspondingly. Each day the grass was swept with an insect net, and when the damselflies were removed the catch was put into the cage to supply food. The females were examined daily and the colors noted. Two orange females died and one was drowned within the first four days.

4 p. m., July 17. One female showed the first indication of change, the bronze black of its abdomen beginning to look dull and velvety.

9 a. m., July 18. The female noted on July 17 was found dead in the water. Three orange females now remained. On one the black was dull and velvety and the under parts of the head and thorax were greenish.

3 p. m., July 19. Two females were entirely pruinose and agreed so closely with Williamson's description of the living black female that I can do no better than to quote it. "Bluish or grayish, pruinose; mid-dorsal thoracic and humeral stripes black; abdominal segments 1 to 7 with their apices darker, usually black, and 8 to 10 black." The marking on segment 8 was a black triangle covering the posterior half of the segment, with the base of the triangle at the apex of the segment. The face, sides of the thorax and under parts were greenish. The pterostigmata of all four wings were brown. When placed in alcohol this specimen agreed entirely with Williamson's description.

At this time, the remaining bright orange female was found mating.

9 a. m., July 20. The orange of the female which was seen mating on the previous afternoon had changed to dark brown on the thorax and head, but a little orange was still visible on the sides of segments 1 and 2. The remainder of the dorsum was dull grayish blue and there was a band on the apex of segments 1 to 7 and the posterior half of 8, while all of segments 9 and 10 were blackish. The face, sides of the thorax and the underparts were greenish yellow.

The two pruinose females were slightly darker in color, the apex of the blackish triangle on 8 having almost reached the basal border of the segment. These three individuals were placed in a smaller cage of wire gauze.

Six orange females which had emerged in the laboratory on July 19 and 20 were now placed in the large cage and no males included.

9 a. m., July 24. No change occurred until this date, when one orange female became slightly pruinose with a tinge of brown on the abdomen.

July 25. Two other females had become pruinose, and in time these and the one observed July 24 assumed a coloration like the one first described. No further change was noted in those which had been placed in the small cage except that they became more pruinose.

From these data we may conclude that the female of *Ischnura verticalis Say* varies somewhat in size and at the time of emergence is marked with bright orange on the postocular spots, the thorax and the first three segments of the abdomen. Four days or more after emergence, this orange turns to brown and then to a gray blue. At the same time the bronze black becomes bluish or blackish. The face, sides of the thorax and the underparts become yellowish green. This entire color change may take place in less than eighteen hours, and may occur either before or after mating. The rapidity with which the color changes occurred after mating in the

instance observed may account for the fact that no orange females have been seen ovipositing in the field. The fact that the pruinose orange female assumes with age the deeper coloration of the so-called black one, would naturally make this latter form far more numerous in the fall.

BIBLIOGRAPHY.

1893 CALVERT, P. P.—Catalogue of the Odonata (Dragonflies) of the Vicinity of Philadelphia. Trans. Amer. Ent. Soc. XX, pp. 152-272.

1899 NEEDHAM, J. G.—Directions for Collecting and Rearing Dragon Flies, Stone Flies and May Flies. Bull. U. S. Nat. Mus., No. 39, Pt. O. 9 pp.

1903 NEEDHAM, J. G.—Aquatic Insects in New York State. Bull. N. Y. State Mus., 68, pp. 218-279.

1900 WILLIAMSON, E. B.—The Dragonflies of Indiana. Geol. Surv. Indiana Rept., pp. 229-333. 7 pls.

THE DIMORPHISM OR DICHROMATISM OF THE FEMALES OF ISCHNURA VERTICALIS.

By PHILIP P. CALVERT, University of Pennsylvania, Philadelphia, Pa.

Of the authors who have written on the females of *Ischnura verticalis*, I believe that only Calvert (1893) and Williamson (1900), both in part only, Ris (1903) and Walker (1908) have correctly recognized the true dimorphism which exists in this sex *in individuals of the same age*. The two forms recognized by others are *not forms of equal age, but color differences due to age*. Miss Lyon, in her preceding paper, has shown that the orange female becomes pruinose and black, but I think that she has experimented with but one form of female to be found in this and other species of *Ischnura*, that which in treating of the genus, in the *Biologia Centrali-Americana*, I called the *heterochromatic* female, as being colored unlike the male.

The two true dimorphic or dichromatic forms are only to be recognized with certainty when the student has teneral, or relatively recently emerged, females before him. Their differences may be most concisely shown in a table:

DIFFERENTIAL CHARACTERS	HOMOEOCHROMATIC, "BLUE" OR "GREEN," ♀	HETEROCHROMATIC OR "ORANGE," ♀
Pale postocular spots.	Not confluent with the pale color of the rear of the head.	More or less confluent with the pale color of the rear of the head.
Predominant color on thorax.	Pale bluish.	Yellow or pale orange.
Blackish humeral stripe.	Wider than the pale antehumeral stripe.	Narrower than the pale antehumeral stripe.
Abdominal segment 1: Dorsum.	Dark metallic blue or green, only the articular membrane between 1 and 2 pale.	Yellow or orange with small black dots (four, two or one).
Sides	Pale bluish.	Yellow or orange.
Abdominal segment 2: Dorsum	Dark metallic blue or green for its entire length, narrowed at its hind end.	Yellow or orange with black markings varying from a narrow crescent at two-thirds of the segment's length to a spot on the first- and one on the third-third, connected by a fine mid-dorsal line.
Sides	Pale bluish.	Yellow or orange.
Abdominal segment 3: Dorsum	Dark metallic blue or green contracted at anterior end to a mid-dorsal line (thus forming what is usually described as a basal pale ring interrupted mid-dorsally) and at the hind end to a smaller degree.	Yellow or orange, the hindmost fourth dark metallic green prolonged forward as a tapering black line almost to, or to, the fore end of the segment.
Sides	Pale bluish.	Yellow or orange.

Both of these forms have, in their earliest imaginal state, *the eighth and ninth abdominal segments pale blue,* each segment *with a lateral black stripe* each side, extending from the fore end to two-thirds of the segment's length on 8, and to half-length of 9. The right and left lateral black stripes are connected with each other on each segment by a transverse black stripe at the fore end, which cross-stripe is distinctly wider (equal in some to even one-fourth of the segment's length) on 8 than on 9 (on the latter a little more than a line).

There is no constant difference in the size of these two females.

The homoeochromatic female from which I have chiefly drawn up this description appears, from its chitinization, to be more immature than the heterochromatic female which I employed. There is, therefore, no ground for supposing that the former is an older and in consequence a more blackened form of the latter. Judging from the material before me, both the homoeochromatic and the heterochromatic females above described, become darkened and eventually pruinose. One can, in some cases, determine whether a partly blackened female belonged originally to one or the other form by examining carefully those parts compared in the table on page 63 and recognizing their shape, size or tint under the partial concealment of the changing colors. Probably the pale blue on abdominal segments 8 and 9 disappears earlier in the heterochromatic females than in others.

A hint that occasionally an intermediate or a composite of the two forms exists is afforded by a well-chitinized female taken by myself at Delair, New Jersey, August 13, 1903. In most respects it agrees with our table for the homoeochromatic form, but differs therefrom in having the pale post-ocular spots confluent for about one-third of the width of each with the pale color of the rear of the head, the sides of abdominal segment 3 with an orange tinge which invades the dorsum in the anterior two-fifths of the segment, leaving only a narrow mid-dorsal black line on this part of the segment and two or three small isolated black spots on the sides, the posterior three-fifths of the dorsum being solidly metallic greenish-black.

Material examined in drawing up the preceding account:

Homoeochromatic Females.—Tinicum Is., Pennsylvania, June 22, 1889, 1 teneral; west side Schuylkill River below Gray's Ferry, Philadelphia, May 4, 1889, 1 teneral. Philadelphia, June 5, 1900, one specimen a little older. Philadelphia, May 22, 1904, 1 teneral. These four have abdominal segments 8 and 9 blue with lateral black stripes. Tinicum Is., May 21, 1904, one specimen with abdomen pruinose.

Heterochromatic Females.—Tinicum Is., Pa., June 22, 1892, 1 teneral; May 21, 1904, two specimens. Christiana Creek, Elkhart, Indiana, May 21, 1897, 1 teneral by R. J. Weith. Vermont, by Mrs. A. T. Slosson, 1 specimen. Only the Tinicum Is. specimens have 8 and 9 blue with lateral black stripes, but all five have yellow or orange distinct on head, thorax and first three abdominal segments.

Composite (?) *Female.*—The Delair female noted above.

The eleven specimens cited are in the collection at the Academy of Natural Sciences of Philadelphia. At different times I have given other specimens to Mr. E. B. Williamson and Prof. J. G. Needham.

Among my unpublished notes I find the following which I leave in their original form:

Teneral female *Ischnura verticalis* taken at pond, Botanical Garden, University of Pennsylvania, 8.55 A. M., May 13, 1904; able to fly, wings and body still quite flabby, colors pale but sufficiently well-marked to see that the 8th and 9th abdominal segments were pale with a black stripe on each side of each as in the male of this species. Placed in a "Lightning" pint jar whose top was covered with a piece of netting; contained a bit of twig for fly to crawl on.

Examined 3.30 P. M. same day; dark colors much more marked, pattern of 8 and 9 as before.

May 14, 9.45 A. M. Pattern as before, dark colors on body generally well-marked, black stripes on sides of 8 and 9 not reaching to apex of respective segments.

May 15, 12.30 P. M. Markings as on preceding record.

May 16, 12.30 P. M. No apparent change.

May 17, 9.15 A. M., do. May 18, 6 P. M., do. May 19, 6 P. M., do. May 20, 1.45 P. M., do. May 21, 3.45 P. M., do. May 22, A. M., dead, no change in the colors but still evidently teneral, no pruinosity.

Two teneral females of *Ischnura posita* collected same time [*i. e.*, May 13, 1904, etc.] and place. If anything, more teneral than *I. verticalis* ♀; did not show any trace of pale markings on dorsum of 8 and 9, *i. e.*, had practically pattern of adult. Three males, one female, teneral, *posita*, taken 10 A. M., May 14, 1904, likewise did not show any traces on 8-10 of a pattern different from that of the mature individuals.

It is probable that the teneral female of *I. verticalis* of May 13-22, 1904, is the homoeochromatic female cited above as of May 22, 1904, although it is merely labeled "Phila., May 22, 1904." Although it was kept alive in captivity for at least eight days, there is nothing in the notes to indicate that it was given any food and in this respect, and in its more limited range of movement, the experiment differed from those by Miss Lyon. These differences may account for the absence of color changes.

The authors who have described the females of *Ischnura verticalis* are the following:

Say (1839) described a "slightly pruinose" female, but it is not possible to determine whether it was of the homoeochromatic or heterochromatic form. In the original description, the signs ♂ and ♀ have evidently been transposed, as the content and the first line of the account of the true male indicate. LeConte (1859) in his edition has retained these signs and has made the error worse by altering the word "female" to "male" in the first line of the description of the true male.

Hagen (1861, page 76, under *A. ramburii*) very briefly described the heterochromatic female of such an age that "the whole of the abdominal dorsum" had become "brassy-fuscous" and a still more aged "pruinose" female which may have been originally homoeo- or heterochromatic.

Selys (1876) described an "adulte" and a "jeune" female, but there is nothing in the descriptions to indicate to which of the forms we have distinguished above they belonged.

Provancher (1876) translates Hagen's description of 1861 under the same name, *Agrion ramburii*.

Calvert (1893) distinguished a "black" and an "orange" female. Under the former heading he mentioned one as being "colored like ♂ (teneral)"; this is the homoeochromatic female of the present paper and some of the specimens on which this statement of 1893 was based are still before me. The other females referred to as "black" were said to have the "greater part of body *pruinose*," etc.; this would apply equally well to aged homoeochromatic, or to aged heterochromatic, females. The "orange" females of 1893 were evidently heterochromatic forms in which the blue of abdominal segments 8 and 9 had already been replaced by black.

Needham (1898) figured a heterochromatic female of the same degree of coloration.

The two females described by Kellicott (1899) are, following his order, "(b) orange and bronze black" = a heterochromatic female as described by Calvert (1893), and "(a) black and green (pruinose)" = an aged homoeo- or heterochromatic female.

Williamson (1900) recognized a "black" and an "orange" female. As the black females are said to have "postocular spots connected or not," it seems likely that they included advanced individuals of both the homoeochromatic (*i. e.*, postocular spots not connected) and the heterochromatic (*i. e.*, spots connected) forms. His orange females are evidently heterochromatic forms like those of Calvert (1893) and of Kellicott (1899), but he perceived and recorded that "this form becomes entirely pruinose."

Ris (1903) regarded the females as showing "a curious polymorphism." His expression "In some teneral females of the green form the upper side of segments 8 and 9 is largely blue" refers to homoeochromatic females of *verticalis* or of *kellicotti*, more probably the former. While he does not mention the earliest stage of heterochromatic females (*i. e.*, those with blue on abdominal segments 8 and 9), he recognizes the dimorphism (or dichromatism) of green and orange females, although his "fully adult" individuals of the latter are not the most fully altered in their colors.

Needham (1903, pl. 17, fig. 5) has reprinted his figure of 1898.

Two figures by Howard (1903, pl. xlvii, figs. 2, 4) seem to be referable to pruinose females of indeterminable form.

Walker (1908) briefly summarizes "two color varieties" of females, "the 'black female,' colored like the male when young," which implies our homoeochromatic form, and the "orange female," a heterochromatic form of unspecified age. He adds, "Both forms become pruinose when old, appearing then as though covered with a dull bluish dust . . . The latter [black female] seems to become pruinose very soon after maturity." The last-quoted sentence probably explains why so relatively few homoeochromatic females with blue on segments 8 and 9 have been recorded in the literature, and why the true characters and relations of this form have not been more largely recognized.

Muttkowski's descriptions of 1908 apply to the same conditions noted by Kellicott (1899).

If my interpretation of specimens and of descriptions be correct, I must assume one of three possibilities from Miss Lyon's work. 1. That she overlooked the presence of blue with the lateral black stripes on abdominal segments 8 and 9 of her youngest orange females, or 2, that the blue on these segments disappeared within 48 hours, or 3, that some orange

females never, at any time, possess this coloration on the two segments in question. The determination of the correctness of these assumptions affords a field for further observation and experiment. Those who undertake this should carefully note the colors of the living insects at frequent intervals with reference to some work like Ridgway's *Color Standards and Color Nomenclature.*

Bibliography Supplemental to that Cited by Miss Lyon.

SAY, 1839. Journal Acad. Nat. Sciences, Phila., viii, p. 37.
LECONTE, 1859. The Complete Writings of Thomas Say on the Entomology of North America. New York. Ballière Bros. Vol. II, p. 408.
HAGEN, 1861. Synopsis of the Neuroptera of North America. Smithson. Inst.
SELYS, 1876. Bull. Acad. Roy. Sci. Belg. (2), xli, p. 266.
PROVANCHER, 1876. Naturaliste Canadien, viii, p. 323.
NEEDHAM, 1898. Outdoor Studies. A Reading Book of Nature Study. New York, Cincinnati, Chicago. American Book Co. P. 61, fig. 61.
KELLICOTT, 1899. Ohio State University Bulletin (4), No. 5, p. 48.
RIS, 1903. Ent. News, xiv, p. 216.
HOWARD, 1903. The Insect Book. New York, Doubleday, Page & Co.
WALKER, 1908. Ottawa Naturalist, xxii, p. 50.
MUTTKOWSKI, 1908. Bull. Wis. Nat. Hist. Soc., vi, p. 78.

Descriptions of New Genera and Species of the Dipterous Family Ephydridae.—II*

By E. T. CRESSON, JR., Academy of Natural Sciences, Philadelphia, Pa.

Dichaeta atriventris n. sp.

Similar to *caudata* Fall. but smaller (3.0 mm.) and the abdomen is entirely shining black, especially in the female, without any traces of grayish apices to the segments; the face is somewhat shorter in proportion.

Holotype.—♂, Colorado Springs, Colorado. Aug. 5915 ft. alt. (E. S. Tucker). [University of Kansas Collection.]

Paratype.—1 ♂, with same data.

This may be merely a variety of *caudata* but I have been unable to find any intergradents.

*Paper I. ENT. NEWS, xxv. 241, 1914.

Paralimna texana n. sp.

Similar to *P. appendiculata* Loew, but averaging lighter in general color on account of the non-coalescence of the brown irroration, especially of the mesonotum. The fourth vein lacks the appendages so distinctive of that species. Furthermore the fore femora of the male have the mesal flexor ciliation well developed, of curved flattened bristles, while the lateral series is complete nearly to the apex and is composed of numerous normal bristles arranged more or less irregularly towards the base. The fore femora and tibiae are slightly bent and their flexor surfaces more or less flattened. The wings are noticeably milky in well-preserved specimens. The females are difficult to separate from those of *appendiculata,* especially those from the southern localities. This may ultimately prove to be merely a subspecies of that species, but the characters noted above are of sufficient importance at present to warrant their use as a basis for a new species.

Holotype—♂, Austin, Texas, October 1900. [Washington State College Collection.]

Paratypes.—2 ♂, 5 ♀, with same data.

Hydrellia proclinata n. sp.

Black, subopake, obscurely metallic green; halteres lemon yellow. Frons opake black, with median area slightly greenish; lunule, face and cheeks densely bluish white. Mesonotum: scutellum much obscured by the thin brownish or hoary dust; pleura brownish with propleural and pteropleural hoary spots. Abdomen shining apically. Wings hyaline with black veins.

Head broader than high. Frons with strong mesofrontal bristles, including a pair of distinct proclinate pre-ocellars, also a strong proclinate orbital and a few setulae, the *usual reclinate orbital being absent.* Face 2.5 to 3 times as long as broad, nearly flat, very weakly carinate for its full length; 4-6 side bristles with a series of smaller ones nearer orbits. Cheeks equalling width of third antennal joint. Antennae short; third joint rather conical, as long as broad; arista thickened on basal half, with 5-7 hairs. Thorax and its chaetotaxy normal. Scutellum flat, truncate. Abdomen of male elongate with segment 5 as broad as long, truncate. Legs normal; hind femora with two series of setulae on lateral surfaces. Wings with second costal section 1.5 as long as third. Length, 1.75-2.75 mm.

Holotype.—♂, Berkeley Hills, Alameda Co., California, April 20, 1908 (Cresson). [Type No. 6075. A. N. S. P.]

Paratypes.—3 ♂, 5 ♀, with same data.

Differing from all known American species in having no reclinate frontal orbital bristles and in the face having two series

of facial bristles. The intensity of the pruinose coating of the mesonotum varies considerably, and the upper frontal orbital bristle is more or less developed but is always much smaller than the lower.

Parydra nitida sp. nov.

Black, similar in form to *P. bituberculata* Lw. Front polished with hardly any perceptible brown pollen, and of a more or less metallic color; face with lower part, clypeus, cheeks and occiput whitish pruinose. Metanotum also rather polished and nearly destitute of brown pollen, with the anterior portion of two median grayish vittae perceptible. Scutellum also polished, broadly rounded apically; the small apical tubercles not approximate and the lateral ones very small. Pleurae on lower part and pectus whitish pruinose. *Metanotum broadly polished medianly with the lateral angles distinctly pruinose, the respective areas sharply defined.* Abdomen rather shining metallic green, more or less faintly whitish. Legs black with tarsi only faintly rufous basally; the basal and apical silver spots of tibiae very distinct. Wings as in *P. bituberculata,* but cross-veins rather faintly clouded, and second vein ending beyond posterior cross-vein. Length 3.5-4.5 mm.

Holotype.—♂, Potlatch, Idaho. VI. 20. 1901. (J. M. Aldrich). [Type No. 6071, A. N. S. P.]

Paratypes.—2 ♂, 2 ♀, with same data.

The rather polished dorsal surfaces, the broad scutellum with the very small tubercles, and particularly the distinctively polished metanotum are the salient characters.

CIRRULA nov. gen.

In general appearance similar to *Ephydra*. Front broad, flat, slightly oblique but little depressed; vertical bristles weak, only two orbitals, near vertex; frontal plate extending forward beyond line of facial orbits, with a widely separated pair of proclinate converging setulae at anterior margin. Face in general projecting but more prominent at the medial hump between the distinct antennal foveae, in profile slightly concaved and retreating; evenly clothed with fine hairs; a tuft of very long down-curved bristles on the medial hump. Antennae short; second joint large, swollen; third rounded. Mesonotum nearly destitute of bristles except marginally; dorso-centrals represented by four short hair-like bristles hardly differentiated from the pile; acrostichals wanting; prescutellars

large; 1 humeral, 1 presutural small, 1 small supra-alar, 2 post-alars, 4 scutellars, 2 noto-, 1 meso-, 1 sterno-pleural present. Abdomen normal. Legs long, more or less characteristically developed in male; claws nearly straight; pulvilli wanting. Wings normal with post.c.v. straight but oblique.

A well-marked genus based on the tufted arrangement of the facial bristles which are not situated on the sides of the face as is usual with the Ephydridae, but are confined to a tuft on the hump between the antennae. Only one, the following species, is known.

Cirrula gigantea n. sp.

Black with yellow halteres; metallic-colored, mostly tawny to brown pruinose. Frontal plate shining, bluish-green, sparingly dusted with brown, with an elongate, narrow indentation just before the ocellar tubercle, clothed with short, appressed hairs; orbits very narrow, opake, brown pruinose with two orbitals in a series of fine setulae; frontalia distinct, opake, velvety brownish-black, much dilated anteriorly. Face opake, golden brown with a shining metallic spot between antennal foveae above; bristles as long as face; oral cilia few, long, laterally. Checks concolorous, about one-third the height of head. Antennae with third joint slightly longer than wide, conical; arista bare, except the thickened basal third pubescent.

Mesonotum shining, but more or less obscured by brown dust; an approximated anterior pair and a widely separated posterior pair of grayish stripes which are more or less opake in certain aspects. Scutellum concolorous, convex, with a few marginal hairs which are hooked at their ends. Pleurae below and metanotum grayish. Abdomen somewhat shining, glaucous green with long, hooked hairs apically; of male narrower than thorax, rather long, with seg. 2-4 subequal, 5 about one and one-half times as long as 4, triangular, rather acute apically; of female wider and shorter in proportion. Legs with anterior coxae silvery gray; all femora greenish-tinged and brownish, distinctly haired; male fore tarsi widely dilated and flattened, post-tibiae with an apical, lateral flexor tuft of long, hooked bristle-like hairs, its basal tarsus somewhat flattened and ciliate on lateral flexor margin, also evident on the next joint; extensor surface of post-tibiae narrowly polished. Wings brownish with costal sections 1 and 2 and veins 1 and 2 yellow. Length 7-9 mm.

Holotype.—♂, Cohasset, Mass. Sept. 8, 1904. [Type No. 6072. A. N. S. P.]

Paratypes.—3 ♀ with same data.

Scatella intermedia n. sp.

Black. Front twice as broad as long, shining, with a metallic green tinge and slightly gray pruinose. Face half as broad as vertex, as broad as long, protruding most at oral margin for about half the width of eye, entirely grayish or whitish with slight brown tinge above and laterally; 3 to 4 laterally-inclined bristles each side, the lowest of which is much longer than the next one, also a short ventrally-inclined bristle at lateral angle; setulae distinct and numerous; oral margin ciliate anteriorly. Cheeks half the width of antennae with distinct bristle. Third antennal joint slightly longer than broad, broadly rounded apically; arista twice the third, nearly bare.

Mesonotum somewhat shining, more or less obscured by brown dust which becomes more bluish-gray at margins; anterior d. c. and sutural acrostichals present; no postacrostichals. Scutellum concolorous, flat, apex rounded. Pleurae more grayish below; metanotum bluish gray. Halteres yellow. Abdomen elongate, shining, brown and gray pruinose; segment 4 of male one and one-half times as long as 3. Legs more or less brown and gray pruinose. Wings blackish-tinged, with five diluted spots of same arrangement as in *stagnalis* Fall.; costal sections 3 and 4 subequal; ultimate section of vein 4 slightly longer than preceding. Length 3 mm.

Holotype.—♂, Milbrae, Salt marsh, San Mateo Co., California. March 20, 1908. (Cresson). [Type No. 6073. A. N. S. P.]

Paratypes.—2 ♂, 2 ♀, with same data.

This may be *pentastigma* of Thomson, but only comparison of the types will make this certain. The wing spots are sometimes very faint. The gray coloration of the thorax and abdomen varies to some extent in its extensions. Belongs to the small group having both distinct anterior dorso-centrals and sutural acrostichal bristles present.

Scatella intermedia var. **obscuriceps** n. var.

Generally darker, with face dark brown or cinnamon-colored and wing spots more distinct.

Holotype.—♂, Swarthmore, Pennsylvania. April 18, 1909. (Cresson). [Type No. 6074. A. N. S. P.]

Paratype.—1 ♂, with same data.

I cannot consider this a distinct species although no intergradents have been seen.

Three New Species of Aphelinus (Hym.).

By E. W. Rust, Assistant Government Entomologist, Lima, Peru.

Aphelinus capitis sp. nov.

♀. Length, 0.75 mm.; expanse, 1.7 mm.; greatest width of forewing, 0.27 mm.

Antennal scape long and slender, reaching to top of head, slightly compressed laterally and of nearly equal cross section throughout its length except at the extremities where it tapers sharply to the articulations; pedicel just a trifle less than half as long as the scape and nearly half again as wide at its widest point, increasing gradually in diameter to a point just distad of its middle where it is half as wide as long; funicle joint 1 triangular in outline, *very* small and sometimes quite indistinct, being of less than half the size of funicle joint 2, which latter is of the same diameter as the pedicel and of a bit less than one-third its length; the penultimate joint is from two-thirds to four-fifths as long as the pedicel and just a shade wider, it is also three times as long as the second funicle joint which it just exceeds in diameter; the second or ultimate club joint, which is compressed laterally, is three times as long as the penultimate joint and at least one-third wider (when seen in broad outline), widest just distad of the middle from where it tapers rapidly to a blunt point. A deep constriction occurs between the two club joints separating them quite distinctly. Club, with a few longitudinal keels and (in common with the rest of the antenna) sparsely hairy.

Eyes hairy. Head and rest of body very similar to *A. diaspidis* How. both in shape, position and number of hairs or spines and in general sculpture, except that the mesoscutum and mesoscutellum of *A. capitis* are faintly longitudinally striated instead of showing the slightly tessellated pattern of *A. diaspidis*.

The forewings, in structure, are nearest like those of *A. mytilaspidis* How., but differ in that the discal cilia do not appear to be quite so plentiful as in the last named species. In *A. capitis* there is a greater difference in the length of the cilia on opposite sides of the hairless streak, those distad being seemingly shorter than in *A. mytilaspidis* and those proximad being slightly longer. The latter cilia, although of about the same numbers as those of *A. mytilaspidis*, more nearly occupy all of the wing surface proximad of the hairless streak, thus producing the impression that the wing is less densely ciliated than in *A. mytilaspidis*. Hind wings as in other species of *Aphelinus*.

Color: Head brownish yellow to orange yellow; eyes blackish except with strong light through them, when they appear garnet-colored; ocelli dark red; antennae concolorous with body or a trifle more

brownish; abdomen and thorax rather a dirty yellow which deepens in some places (notably on dorsal part of thorax) to a honey yellow or brownish yellow. Legs, very light yellow, often nearly white especially toward their extremities; forewings, with a distinct fuscous patch covering the proximal half, the fuscosity being especially pronounced around the stigma and at the proximal border of the patch of discal cilia, much as in *A. fuscipennis* How. Wing veins from honey yellow to almost hyaline.

♂. Unknown.

Described from twenty-five female specimens reared by P. H. Timberlake, of the U. S. Bureau of Entomology, as follows: from *Aspidiotus hederae* on Ivy (*Hedera helix*), Redlands, California, February 20, 1911, and February 26, 1912, and at Santa Barbara, California, November 8, 1911, and May 7, 1912; from *Chionaspis pinifoliae* on *Pinus radiata,* Santa Barbara, California; July 8, 1911, and July 15, 1911; from *Aspidiotus hederae* on oleander (*Nerium oleander*), Santa Barbara, California, April 21, 1911, and May 4, 1911; from *Aspidiotus camelliae* on oleander (*Nerium oleander*), Whittier, California, March 27, 1911; from *Aspidiotus* sp. on *Pinus radiata,* Santa Maria, California, August 4, 1911; from *Aulacaspis zaminae* on *Cycas revoluta,* Montecito, California, August 2, 1912. Also two female specimens reared by the writer from *Aspidiotus camelliae* on *Schinus molle,* Pasadena, California, July 28, 1911. Both glycerine and balsam mounts.

Type on slide labeled: *Aphelinus capitis.* Ex *Aspidiotus camelliae* Sign. on *Hedera helix* (Ivy). 14647 B. May 7, 1912. Santa Barbara, Cal. P. H. Timberlake.

The above species greatly resembles *Aphelinus diaspidis* How. in shape, size, arrangement of the hairs or spines on the body and the infuscation of the wings, but in coloration it more nearly approaches *Aphelinus mytilaspidis.* Also in the ciliation of the wings it resembles most closely *A. mytilaspidis.* However, the small size of the first funicle joint of the antennae at once differentiates this from any other species of *Aphelinus,* and together with the other differences pointed out above, render it a very distinct and unmistakable species. The hairy eyes are also rather exceptional in a species whose general color scheme is as light as that of the insect in question.

Aphelinus quaylei sp. nov.

♀. Length, 0.81 mm.; expanse, 1.41 mm.; greatest width of forewing, 0.21 mm.

Antennal scape long and slender, reaching to top of head, somewhat compressed laterally; pedicel one-third as long as scape and of same width as latter when the same is seen in broadest outline (*i. e.*, side view), increasing gradually in diameter from proximal to distal end; funicle joints taken together are just a shade more than half as long as the pedicel and of the same diameter as the latter at its widest point, first funicle joint slightly longer than the second and the division between these two joints oblique, as is also that between the second funicle joint and the penultimate club joint; the inner side of each funicle joint is longer than the outer side while the opposite is true of the penultimate club joint, thus making each of these three joints somewhat trapezoidal in outline; penultimate club joint about three-fourths as long as the pedicel and a trifle greater in diameter; last antennal joint more or less compressed laterally, at least three times as long as preceding joint (sometimes three and one-half times as long) and about one-third wider than the same (club seen in broad outline), of nearly equal cross section throughout its length, only tapering abruptly to a blunt point from a place very near the distal end. Club with a few longitudinal keels, the two joints being distinctly separated by a well-defined constriction. Antennae moderately hairy throughout.

Eyes faintly hairy. Head and rest of body most closely resembling that of *A. capitis* n. sp. described above, except that the abdomen is naked, or at most, bears a very few very inconspicuous hairs on the edges of one or two segments.

Wings densely ciliated, all cilia being unusually long. On the forewing the discal cilia proximad to the hairless streak are fully twice as long as the others and are arranged in four, or at most five rows.

Color: Head brownish yellow to orange yellow, sometimes with a pinkish cast; eyes, dark garnet red; ocelli, dark red; antennae, concolorous with rest of body which is of a lemon yellow throughout, sometimes deepening to canary yellow on the dorsum; wings hyaline except for a small, faint fuscous patch on the forewings in the clear space between the insertion of the wing and the first discal cilia. Wing veins from nearly hyaline to lemon-colored.

♂. Unknown.

Described from many female specimens reared by the writer at Lima, Peru, and throughout the Department of Piura, Peru, from *Pseudaonidia articulatus, Hemichionaspis minor* and *Aspidiotus camelliae* on various hosts. Also reared by P. H.

Timberlake, of the U. S. Bureau of Entomology, from *Chrysomphalus aurantii* and *Chrysomphalus aurantii citrinus* on citrus trees at Avondale, Walnut, Carpenteria and Whittier, California.

Type on slide labeled: 192° 3b.; *Aphelinus quaylei* ex. *Pseudaonidia articulatus* on *Ficus nitidis*. Lima, Peru. January 31, 1914.—E. W. Rust.

Named in honor of Prof. H. J. Quayle, who has so ably worked out the life history of this parasite; the account of which appears in Bulletin No. 222, California Agricultural Experiment Station, p. 131 (1911). At that time, however, the species was not recognized as being distinct from *A. diaspidis*, and it is under the latter name that the life history is given. The figure (Fig. 21) published therewith is evidently that of *A. diaspidis* and not of *A. quaylei*, to which it does not conform in either antennae, abdomen or wings.

Aphelinus limonus sp. nov.

♀. Length, 0.9 mm.; expanse, 1.55 mm.; greatest width of forewing, 0.23 mm.

Antennal scape rather long and slender, reaching nearly to top of head, somewhat compressed laterally; pedicel a trifle less than one-third as long as scape and of same diameter as the latter at its widest point, increasing slightly in diameter from proximal to distal extremity; funicle joints subequal, taken together they are about two-thirds as long as the pedicel and of about two-thirds the diameter of the same; penultimate club joint of same length as the two preceding joints taken together and of the same diameter as the pedicel; ultimate club joint somewhat compressed laterally, three times as long as the penultimate joint and about one-third greater in diameter at its thickest point; when seen in broad outline it presents one *slightly* curved edge while the other curves more sharply from near the center to the tip, causing the distal half of the club to resemble one horn of a rather blunt crescent. Club slightly longitudinally keeled, the two joints being distinctly separated by a well-defined articulation. Antennae very sparsely hairy.

Eyes naked. Head (especially the vertex) and dorsal part of thorax marked with a coarsely tessellated pattern which is generally quite well-defined. Abdomen naked, and rest of body much less hairy than is common in this genus.

Wing structure like that of *A. quaylei* n. sp. described above except that the discal cilia proximad to the hairless streak are, in certain cases, even *more* than twice as long as the others.

Color: Eyes, black; ocelli, dark red; rest of body of a uniform, semi-transparent, lemon yellow except that the antennae sometimes have a slightly deeper and more brownish cast; wings hyaline except for a slight lemon tinge to the veins.

♂. Unknown.

Described from fourteen female specimens received from E. M. Ehrhorn in a lot of *Hemichionaspis minor* on "pigeon-pea," which he sent to this office from Honolulu, Territory of Hawaii, in June, 1911. Balsam mounts.

Type, one of four on slide labeled: 1° 3r. *Aphelinus limonus* ex. *Hemichionaspis minor* on pigeon-pea. Honolulu, T. H. VI-5-1911. E. M. E. The type specimen lies closest to the slide-label.

This species very closely resembles *A. quaylei* n. sp. and the following points will be of especial use in separating them.

Aphelinus quaylei.	*Aphelinus limonus.*
1 Smaller than *A. limonus.*	1 Larger than *A. quaylei.*
2 Slightly more deeply colored than *A. limonus.*	2 Slightly lighter than *A. quaylei.*
3 Head yellowish brown or brownish orange.	3 Head lemon-colored.
4 Dorsum of thorax striated.	4 Dorsum of thorax tessellated.
5 Forewings with a slight fuscous patch at insertion.	5 Wings hyaline.
6 Eyes slightly hairy.	6 Eyes naked.
7 Eyes dark garnet red.	7 Eyes black.
8 Funicle joints fairly large, closely joined and rather trapezoidal in outline.	8 Funicle joints smaller, regular, bead-shaped and well-separated.
9 Club rather slender and abruptly pointed.	9 Club stouter and having a longer curve to the point. Discal cilia of wings extremely long, often seeming even longer than those of *A. quaylei.*

All types to be deposited in the United States National Museum at Washington, D. C.

Experiments in Destroying Fruit Infested with Fruit Fly Maggots (Dipt.).

By Henry H. P. Severin, Ph.D.

Various methods for the destruction of fruit infested with fruit fly maggots have been recommended by entomologists. In Bermuda, according to Harris (4) some of the fruits infested with Mediterranean fruit fly larvae (*Ceratitis capitata* Wied.) "were collected in sacks, weighted by inserting a big stone before closing the bag, and thrown into the sea." Herrera (5) gives an account of destroying the Mexican or Morelos orange worm (*Anastrepha ludens* Loew) by injecting gasoline or benzine into each fallen, infested fruit, thus avoiding the transportation of heavy loads of oranges to the incinerator or burying ditches.

The daily destruction of all infested fruit by burning, boiling or burying has been recommended by a large number of entomologists. Since the daily burning or boiling of maggoty fruit "is not always a convenient method," as French (1) has already pointed out, and we may add somewhat expensive on account of the fuel consumed, we endeavored to test out the cheaper methods of destroying infested fruit.

A considerable difference of opinion exists among entomologists as to the depth that maggoty fruit should be buried in the soil to prevent the adult flies from emerging. In Mexico, the Commission of Parasitologia Agricola formulated rules to control the Mexican or Morelos orange worm and recommended that infested fruit should be covered with about twenty inches of soil. Froggatt (2).

In 1898 a fruit fly regulation was put into force in Queensland and one method recommended for the control of fruit flies was to bury infested fruit "beneath not less than one foot six inches of solid earth." Kirk (6).

Mally (7), of South Africa, found that, if infested fruit was placed in the bottom of a pit and covered with ten inches of soil, the Mediterranean fruit flies emerged in abundance in due time, but if the soil was carefully tramped, no flies succeeded in escaping.

French (1), of Victoria, recommends "an open trench about three feet deep in which the fruit should be buried and a covering of earth rammed down."

Newman (8), of Western Australia, believes that "two feet of soil, well pressed down, will destroy all the maggots."

Gurney (3), of New South Wales, writes: "Burying fly infested fruit cannot be advocated. Pupae buried 6, 8 and 12 inches below the surface of the soil hatched, and adult flies readily made their way to the surface in all cases."

Van Dine (10), formerly stationed at the Hawaiian Agricultural Experiment Station, recommends that all melons and vines infested with the melon fly maggots (*Dacus cucurbitae* Coq.) should be collected at intervals of five or six days and covered with earth to a depth of several inches.

Channels in moistened sand made by melon flies (*Dacus cucurbitae* Coq.) after emerging from the puparia. The black areas represent flies which died in their attempt to burrow through the sand.

A number of experiments were performed to determine the distance that the Mediterranean fruit flies and melon flies, after issuing from the puparia, were able to burrow through sand and soil.

In the first experiment, several hundred melon fly puparia were placed on two inches of dry, sterilized sand at the bottom of a cylindrical jar (24x11½ inches) and this jar was then filled with more of the same kind of sand. A similar vessel, half filled with dry sand, was then inverted over the top of the above mentioned jar. This was done by placing a heavy glass plate over the mouth of the jar to be turned upside down, inverting the same above the other vessel and then pulling the glass plate out from be-

tween the two jars. A similar experiment was conducted with wet sand which had been previously sterilized. The puparia in both experiments were arranged in a circle close to the wall of the jars so that when the flies emerged and burrowed through the sand their paths might be seen. When the melon flies emerged, many would bore up to the regions where the jars came in contact with one another and then escaped through the small spaces between the jars. These small spaces were due to particles of sand which rested on the rims of the jars. One could scarcely believe that these large flies were able to flatten their bodies to such an extent as to squeeze through such small spaces as existed between the jars.

It was evident that some of the melon flies were not able to burrow as far as others, for many died at the upper end of the channels before obtaining their liberty. (See figure.) Flies would frequently bore into an excavation made by other specimens, and if the union of the channels would form a circular path, some of the individuals would continue to burrow slowly round and round, and finally die in this endless passage. Usually, however, most of the flies showed a definite orientation and bored more or less directly upward. This negative reaction to gravity is common with many insects after emerging from the egg or pupa.

As there was a possibility that the flies might have been hindered by being against the glass, holes two, three and four feet deep were drilled in hard soil with a fence-post borer. At the bottom of these holes from 100 to 1000 Mediterranean fruit fly or melon fly puparia were placed. The puparia were then covered with sterilized dry or wet sand or soil. After these pits were filled each hole was covered at the surface with a large, mouthed jar which rested tightly against the solid earth. The following table shows the number of Mediterranean fruit flies and melon flies which succeeded in boring through two, three and four feet of sand or soil:

TABLE I.

NUMBER OF *Ceratitis capitata* OR *Dacus cucurbitae* WHICH BURROWED THROUGH TWO, THREE AND FOUR FEET OF SAND OR SOIL.

	Ceratitis capitata			*Dacus cucurbitae*	
Number of feet puparia were buried...	2	3	4	2	3
Number of puparia buried in each hole	100	100	1000	500	500
Number of flies that bored through dry sand	44	7	1	34	2
Number of flies that bored through wet sand	14	0	0	8	0
Number of flies that bored through soil	0	0	0	5	0

It is evident from this table that a larger number of both species of Trypetidae were able to bore through dry sand than wet sand, and that very few flies succeeded in making their way through the more lumpy soil.

Lime, which is often thrown into the garbage-can to destroy the larvae of the house fly and blue bottle fly, would probably destroy the fruit fly maggots if it was buried in sufficient quantity with the infested fruit and vegetables, but this method would increase the cost.

As a means of destroying the maggots of *Ceratitis* in fruit, Penzig (9) recommends submerging "it for a short space of time in water."

Gurney (3) submerged Mediterranean fruit fly maggots in sea water "for periods varying from 6 to 45 hours" and in each case a large percentage of the maggots developed into adult flies.

In an experiment, melon fly maggots were submerged in fresh water for a period varying from two to four days, in order to determine whether such larvae would pupate and give rise to flies. Larvae were selected which had bored out of a pumpkin and were ready to pupate. These maggots were submerged in seven inches of distilled water which was renewed daily. After remaining in the water for two, three or four days the larvae were transferred to filter paper and after pupation the puparia were placed in moist sand in a breeding jar. The following table indicates the results obtained:

TABLE II.

NUMBER OF MELON FLY LARVAE WHICH PUPATED AND ISSUED AS ADULT FLIES, THE LARVAE BEING SUBMERGED IN SEVEN INCHES OF WATER FOR A PERIOD OF TWO TO FOUR DAYS.

Number of larvae	*Days submerged in water*	*Number pupated*	*Number of dead pupae*	*Adults reared*
100	2	75	28	47
100	3	16	11	5
100	4	0	0	0

Oranges which were infested with the larvae of the Mediterranean fruit fly were thrown into a barrel containing water, while other oranges were cut in half before throwing them into the barrel. A day later many of the smaller maggots were found floating on the surface of the water while some of the larger maggots extended out stiffly from holes in the peel of those oranges which had not been cut. Some of these larger maggots were placed upon moist filter paper in a dish, and most of the larvae became active within several hours. Traces of life in a small per cent. of the maggots could be found after the infested fruit had remained in water for three days. After the fruit had been in the barrel of water for a period of four days, the contents were dumped into a half dozen boxes and covered with several inches of soil. No Mediterranean fruit flies, however, emerged. Undoubtedly certain chemicals could be added to the water, which would destroy the fruit fly maggots in the infested fruit in less time, but this again, would increase the cost.

CONCLUSION.

Burying infested fruit in over three feet of loose soil would require a considerable amount of labor. If Mally's (7) method of burying fruit beneath ten inches of soil carefully tramped will prevent the fruit flies from escaping, it will not only prove to be one of the cheapest and most practical methods of destroying infested fruit, but it will also be a means of adding a valuable fertilizer to the soil. Submerging fruit in water for

a period of four days would be quite effective, provided the infested fruit is collected daily and submerged in water. The two last methods, however, could be advantageously combined. Infested fruit could be collected daily and thrown into a barrel or tank of water, and when a sufficient amount has accumulated the maggoty fruit could be buried. This would do away with the daily plowing or digging of trenches, filling in and tramping of the soil. In large orchards, however, the daily gathering of infested fruit would be rather expensive on account of the labor.

BIBLIOGRAPHY.

1. FRENCH, C. 1907. Fruit Flies. Repr. Jour. Agric. Victoria. Bull. No. 24, pp. 1-14.
2. FROGGATT, W. W. 1910. Fruit Flies. Dept. Agric. New South Wales. Farmers' Bull. No. 24, pp. 1-56.
3. GURNEY, W. B. 1912. Fruit Flies and other Insects Attacking Cultivated and Wild Fruits in New South Wales Ibid. No. 55, pp. 1-31.
4. HARRIS, T. I. 1907. The Bermuda Colonist. Published in Froggatt's (2) paper, pp. 39-41.
5. HERRERA, A. L. 1908. The Orange Worm (Trypeta ludens). Jour. Econ. Ent. I, No. 3, pp. 169-174.
6. KIRK, T. W. 1909. Fruit Flies. New Zealand Dept. Agric. Bull. No. 22, pp. 1-18.
7. MALLY, C. W. 1904. The Fruit Fly. Repr. Agric. Jour. Cape of Good Hope, No. 28, pp. 1-18.
8. NEWMAN, L. J. 1910. Fruit Fly. Dept. Agric. Industries. Western Australia, Bull. No. 38, pp. 1-11.
9. PENZIG, O. 1887. Studi botanici sugli agrumi e sulle piante affini. Ann. Agr. Minestero. p. 47. See Insect Life, III, pp. 80-81.
10. VAN DINE, D. L. 1907. The Melon Fly. Ann. Rept. Hawaii Agric. Exp. Sta. for 1907, pp. 30-35.

The Seventieth Birthday of Prof. Metschnikoff.

Science for Dec. 25, 1914, calls attention to the fact that Prof. Elias Metschnikoff (or Elie Metchnikoff), "the eminent Russian pathologist, who for the last twenty-six years has been engaged in research at the Pasteur Institute in Paris, will be seventy years old next" May and states that a *Festschrift* for him has been in preparation. It should not be forgotten that in earlier years Metschnikoff published important papers on the embryology of scorpions (1871), of chilognathous myriopods (1874, 1875), of Hemiptera and other insects (1866).

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., FEBRUARY, 1915.

Selection of Papers for Scientific Meetings.

As is shown on other pages of this issue, there were ninety-six papers on entomological topics presented at the Convocation Week meetings in Philadelphia between Monday noon and Friday noon. A few of these were given simultaneously before different societies. Seventy-one papers were listed on the program of the American Society of Zoologists, to be delivered between 9 a. m. Tuesday and noon on Thursday. Fifty-seven titles appeared on that of the American Phytopathological Society, to begin on Wednesday at 9.30 a. m. and to end at some indefinite hour on Friday.

What was the result? The non-appearance of some authors shortened the sessions. Some entomologists who were present and intended to read their contributions asked, when their names were called, that their papers be read by title only. The Zoologists found it necessary, on their third day, to divide into two sections holding sessions at the same time. Everywhere communications were necessarily reduced to a minimum and full discussion was hampered by the ever-present sense of the lack of time. That a mental dyspepsia accompanied this feeling is self-evident.

It is idle to think of increasing the number of days for meetings. The remedy must be sought in some curtailment of the number of papers presented. In this way alone is the most valuable feature—full discussion—to be preserved. Curtailment can only be obtained by selection of a few out of the many. Presumably this choice must be made by executive committees of the organizations concerned. In many cases selection will be in favor of the older and better known men to the exclusion of the rising, younger membership, who should be encouraged. Difficult problems will thus be created, but there seems to be nothing else to do but to face them and solve them on the selection basis, although in some cases the issues will be evaded by a greater segregation of the societies in place and time.

Thus does the Advancement of Science and the increase in specialization thwart us, driving us into narrower limits whether we will or no.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Change of Address.

A. A. Girault *to* U. S. National Museum, Washington, D. C., U. S. A.

Entomologists in the War.

E. E. Austen, the dipterist, K. G. Blair, coleopterist, and N. D. Riley, lepidopterist, all of the British Museum of Natural History, are said to be at the front. (*Science*, Jan. 1, 1915).

Identification of Specimens.

The following specialists will determine material in their respective groups, from North America, unless otherwise noted. Those whose names are preceded by * should be communicated with before sending specimens, as their time for such work is limited, or they are interested only in special groups or genera. See the NEWS for January, 1915, pages 33 and 35, for directions for sending specimens.

DIPTERA.—*Chironomidae* and *Mycetophilidae*: O. A. Johannsen, Cornell Univ., Ithaca, N. Y.; *Empididae*: A. L. Melander, Pullman, Wash.; *Syrphidae*: A. L. Lovett, Corvallis, Oreg.; *Acalyptratae*, especially *Ephydridae*: E. T. Cresson, Jr.; *Leptidae*: M. D. Leonard, Dept. of Entom., Cornell Univ., Ithaca, N. Y.

HEMIPTERA.—*Jassidae*: E. D. Ball, Logan, Utah; *Aphididae* (Material in this family should be provided with complete data on food plants, correct scientific names of same, date and location of capture): C. P. Gillette, Fort Collins, Colo.; H. F. Wilson, Corvallis, Oreg.; Edith M. Patch, Orono, Maine; *Psyllidae* (see note under *Aphididae*): Edith M. Patch, Orono, Maine; *Aleyrodidae*: J. R. Watson, Gainesville, Fla.; *Coccidae*: *J. G. Sanders, Madison, Wis.; *Chionaspis, Hemichionaspis* and *Phenacaspis* of the world: R. A. Cooley, Bozeman, Mont.

HYMENOPTERA.—*Tenthredinidae* and *Uroceridae*: *A. D. MacGillivray, 603 W. Michigan Avenue, Urbana, Ill.; *Aphidiinae* and *Ophiinae*: A. B. Gahan, College Park, Md.; *Chalcidoidea*: A. A. Girault, U. S. Nat. Mus., Washington, D. C.; *Megastigmus*: C. R. Crosby, Cornell Univ., Ithaca, N. Y.; *Sphecidae*: H. T. Fernald, Amherst, Mass.; *Apoidea*: E. G. Titus, Logan, Utah; from Nebraska, Myron H. Schwenk, Lincoln, Neb.

MALLOPHAGA AND ANOPLURA.—*V. L. Kellogg, Stanford Univ., Cal.

NEUROPTERA.—W. E. Hinds, Auburn, Ala.

ORTHOPTERA.—*J. A. G. Rehn, Acad. Natural Sciences, Phila., Pa.

LEPIDOPTERA.—*Rhopalocera*: Henry Skinner, Acad. Natural Sciences, Philadelphia, Pa.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

2—Transactions of the American Entomological Society, Philadelphia. **4**—The Canadian Entomologist. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **18**—Ottawa Naturalist. **50**—Proceedings of the U. S. National Museum. **102**—Proceedings of the Entomological Society of Washington. **180**—Annals of the Entomological Society of America. **195**—Bulletin of the Museum of Comparative Zoology, Cambridge. **198**—Biological Bulletin of the Marine Biological Laboratory, Woods Hole. **220**—New Jersey Agricultural Experiment Station, New Brunswick. **226**—Transactions, Academy of Sciences of St. Louis. **322**—Journal of Morphology, Philadelphia. **413**—Report of the State Entomologist of Minnesota, St. Anthony Park. **447**—Journal of Agricultural Research, Washington. **490**—The Journal of Parasitology, Urbana, Illinois. **491**—Transactions of the American Microscopical Society, Decatur, Illinois. **494**—Proceedings of the Royal Institution of Great Britain, London. **495**—Massachusetts Agricultural Experiment Station, Amherst.

GENERAL SUBJECT. Cassino, S. E.—The Naturalist's Directory. (Salem, Mass., 1914). 199 pp. **Cooley, R. A.**—Killing small arthropods with the legs extended, **490,** i, 105. **Criddle, N.**—Annual meeting of the Entomological Society of Ontario, 1914. Some personal impressions, **18,** xxviii, 126-7. **Headlee, T. J.**—Report of the entomological department for 1913, **220,** 789 pp. **Herrick, G. W.**—Insects injurious to the household and annoying to man, (The Macmillan Company, 1914), 470 pp. **Howard, L. O.**—Report of the entomologist of the U. S. Department of Agriculture (Ann. Rpt. Dpt. Agric., 1914), 16 pp. **St. John, W.**—Formaldehyde useful in setting insects, **9,** 1914, 325-6. **Slingerland & Crosby**—Manual of fruit insects (The Macmillan Company, 1914), 503 pp.

PHYSIOLOGY AND EMBRYOLOGY. McClung, C. E.—A comparative study of the Chromosomes in orthopteran spermatogenesis, **322,** xxv, 651-730. **Payne, F.**—Chromosomal variations and the formation of the first spermatocyte chromosomes in the European earwig, Forficula sp., **322,** xxv, 559-86. **Turner, C. H.**—An experimental study of the auditory powers of the giant silkworm moths (Saturniidae), **198,** xxvii, 325-32.

ARACHNIDA, ETC. Craig, C. F.—New varieties and species of malarial plasmodia, **490,** i, 85-94. **Todd, J. L.**—Tick paralysis, **490,** i, 55-64.

NEUROPTERA, ETC. Ellis, M. M.—An Acanthosporid gregarine from No. Am. dragonfly nymphs, **491,** xxxiii, 215-22. **Whedon, A. D.**—Preliminary notes on the Odonata of Southern Minnesota, **413,** xv, 77-103.

ORTHOPTERA. Rehn & Hebard—A synopsis of the species of the genus Neoconocephalus found in America north of Mexico, **2,** xl, 365-413.

LEPIDOPTERA. Busck & Boving—On Mnemonica auricyanea, **102,** xvi, 151-63. **Kephart, C. F.**—The poison glands of the larvae of the brown-tail moth. (Euproctis chrysorrhoea), **490,** i, 95-103. **Rau, P. & N.**—Longevity in Saturniid moths and its relation to the function of reproduction, **226,** xxiii, 1-78. **Tsou, Y. H.**—Homology of the body setae of some lepidopterous larvae, **491,** xxxiii, 223-60. **Walker, J. J.**—Buddleia and butterflies; an American note, **8,** 1914, 289-90.

Busck, A.—Descriptions of new micro L. of forest trees. [10 new sps.]; Life history of Eucosma haracana, **102,** xvi, 143-50; 150. **Gibson, A.**—A new Elachistid moth from Manitoba, **4,** 1914, 423-4.

DIPTERA. Back & Pemberton—Life history of the melon-fly (Bactrocera cucurbitae), **447,** iii, 269-74. **Hudson, H. F.**—Lucilia sericata attacking a live calf, **4,** 1914, 416. **Severin & Hartung**—The ravages, life history, weights of stages, natural enemies and methods of control of Dacus cucurbitae, **180,** vii, 177-212. **Shannon, R. C.**—Habits of some Tachinidae, **102,** xvi, 182. **Smulyan, M. T.**—The marguerite fly (Phytomyza chrysanthemi), **495,** Bul. 157.

Dietz, W. G.—The Hebes group of the dipterous genus Tipula [8 new], **2,** xl, 345-63. **Malloch, J. R.**—Notes on the dipterous genus Chyromyia. [2 new sps.], **102,** xvi, 179-81. **Parker, R. R.**—A new Sarcophagid scavenger from Montana, **4,** 1914, 417-23. **Thomas, F. L.**—Three new species of Trypetidae from Colorado, **4,** 1914, 425-29. **Tothill, J. D.**—List of Tachinidae from the Prov-

ince of Quebec, **18,** xxviii, 113-16. **Walton, W. R.**—Report on some parasitic and predaceous D. from northeastern New Mexico. [3 new species, 2 new genera], **50,** xlviii, 171-86.

COLEOPTERA. Boving, A.—Notes on the larva of Hydroscapha and some other aquatic larvae from Arizona, **102,** xvi, 169-74. **Browne, F. B.**—The life-history of a water-beetle, **494,** xx, 754-64. **Duporte, E. M.**—The wavy striped flea-beetle. (Phyllotreta sinuata), **4,** 1914, 433-5. **Palmer, M. A.**—Some notes on life history of lady-beetles, **180,** vii, 213-38.

Hopkins, A. D.—List of generic names and their type-species in the coleopterous superfamily Scolytoidea, **50,** xlviii, 115-36. **Schwarz, E. A.**—Aquatic beetles, especially Hydroscapha, in hot springs in Arizona, **102,** xvi, 163-8. **Schwarz & Barber**—Note on Rhipidandri—a correction, **102,** xvi, 175-77. **Wickham, H. F.**—New Miocene C. from Florissant. [many new], **195,** lviii, 423-94.

HYMENOPTERA. Tower, D. G.—Note on the number of spiracles in mature chalcid larvae, **180,** vii, 248-9.

Cockerell, T. D. A.—Bees visiting Helianthus [2 new species], **4,** 1914, 409-16. **Gahan, A. B.**—Descriptions of n. gen. and sps., with notes on parasitic H. [12 new species, 2 new genera], **50,** xlviii, 155-168. A new sp. of Cheiloneurus with a key to the described species from the U. S. [C. amplicornis n. sp.], **180,** vii, 247-8. **Marcovitch, S.**—A species of Megastigmus reared from larch seeds. [M. larias n. sp.], **4,** 1914, 435-8.

SOME SOUTH INDIAN INSECTS AND OTHER ANIMALS OF IMPORTANCE CONSIDERED ESPECIALLY FROM AN ECONOMIC POINT OF VIEW. By T. BAINBRIGGE FLETCHER, R.N., F.L.S., F.E.S., F.Z.S., Imperial Entomologist to the Government of India (late Government Entomologist, Madras). Madras, India. Price 6 rupees (about $2.25).

The author says the book does not pretend to do more than provide a narrow and tortuous entrance into the vast and almost untrodden field of Insect Life in India. As far as it is possible to give an insight into the insects of India, especially those of economic importance, in 546 pages, the work is a success. It is rather profusely illustrated, having fifty plates in color and four hundred and forty text figures. This book is an example of what is taking place in the Tropics in the way of the study of insect life. Economic entomology is making rapid strides in the warm countries and its value to man is being recognized very generally. The following lines, quoted from the preface, are rapidly losing their significance:

"To that part of Science folks style entomology
Really demanded some sort of apology."

The author says that seven-tenths of the population of India are entirely dependent upon their crops whose produce is always lessened

and sometimes wholly destroyed by the ravages of insects. The book is remarkably well-planned and covers the whole field, including Household Pests, Insects and Disease, Beneficial Insects, Insecticidal Methods, etc. There are also interesting chapters on subjects not usually incorporated into such works, such as, Means of Defence in Insects; Communication Among Insects; Tropisms; Symbiosis and Parasitism; The Balance of Life.

We consider this one of the best books ever published on the subject and a credit to the author and the Government of Madras. We have foregone the pleasure of looking for or finding a typographical error or some slight mistake, which probably makes the review incomplete, but the good is there in great abundance.—H. S. (*Advt.*)

INSECTS INJURIOUS TO THE HOUSEHOLD. By GLENN W. HERRICK, Professor of Economic Entomology in the New York State College of Agriculture at Cornell University. The Macmillan Company, New York. Price, $1.75. 470 pages and 152 illustrations.

If one judges from the requests for information that come to scientific institutions, a work of this kind is urgently needed. Very few householders, if any, escape insect pests of one kind or another and up-to-date, authoritative information will now be available to the public. While the work is not intended as a treatise on insects in relation to disease, there are admirable chapters on some of these pests. A valuable feature of the book is the bibliography following each chapter. Each of the seventeen chapters deals with a group of insects having related activities. This is illustrated by the chapters on insects injurious to clothes and carpets; ants and their activities and invasions of the household. We consider this one of the most useful of the recent books on economic entomology or its subdivisions.—H. S. (*Advertisement.*)

MANUAL OF FRUIT INSECTS. By the late MARK VERNON SLINGERLAND and CYRUS RICHARD CROSBY. The Macmillan Company, New York. Price, $2.00.

The junior author states that the book in part is the result of nearly twenty years' work by Professor Slingerland in studying the insect problems of the fruit-growers of New York State. The more important insect pests of deciduous trees are treated and minor pests altogether omitted. The means of control are given from the standpoint of the commercial fruit-grower. Most of the illustrations are from photographs by Professor Slingerland. There are 492 pages, 396 illustrations and an index of the names of the insects treated. The fruit insects make a rather compact group and lend themselves very well to special treatment. There are professional growers who would find such a work valuable to them and it will also appeal to the suburbanite who has fruit trees around his home. The illustrations are generally satisfactory and in some cases excellent. Some of them lend themselves better to half-tone illustration than others Prof. Slingerland was an expert on insect photography. The junior author has accomplished a valuable piece of work in bringing to light these researches of Prof. Slingerland.—H. S. (*Advt.*)

Doings of Societies.

THE CONVOCATION WEEK MEETINGS.

The American Association of Economic Entomologists and the Entomological Society of America held their annual meetings in Philadelphia between December 28th, 1914, and January 1, 1915, as announced in the NEWS for December, 1914, pages 469-470, except that the closing session of the former occurred in the morning, instead of the evening, of December 31. One hundred were in attendance at the Tuesday afternoon session of the Economic Entomologists, seventy-five at the Thursday afternoon and fifty-six at the Friday morning sessions of the Entomological Society. These are probably not the maximum figures. Fifty-seven papers were listed on the programs of the Economic Entomologists, twenty-seven on that of the Entomological Society. Ten papers relating to insects were included in the list of the joint meetings of the American Society of Zoologists and Section F (Zoology) of the American Association for the Advancement of Science. Two others of entomological bearing were presented elsewhere. The total of 96 exceeds those of 85 and 74 for the corresponding societies in 1912 and 1913 respectively. The proceedings of these societies will be duly published elsewhere, but it will be of some interest to our readers to present here the titles of the papers, grouped according to subject. Those unmarked are from the program of the Economic Entomologists, those starred (*) from that of the Entomological Society; others are designated by abbreviations of the respective societies' names.

GENERAL SUBJECTS.—H. T. FERNALD, Amherst, Mass., Annual Address of the President. Some Present Needs of Economic Entomology.—STEPHEN ALFRED FORBES, University of Illinois, Ecological Foundations of Applied Entomology.*—HENRY SKINNER, Academy of Natural Sciences, A History of the Entomological Society of America.*—W. E. BRITTON, New Haven, Conn., The Academic Training of the Entomologists in Colleges and Experiment Stations of the United States.—V. E. SHELFORD, Urbana, Ill., Suggestions as to the Original Habitat and Distribution of Various Native Insect Pests.—CHARLES

H. T. Townsend, U. S. National Museum, On Proper Generic Concepts.*—Nathan Banks, U. S. Bureau of Entomology, Suggestions for Discovering Affinity and Phylogeny.*—C. P. Gillette, Colorado Agricultural College, Insect Notes from Colorado.*—A. D. MacGillivray, University of Illinois, The Modification of the Subcostal Vein in the Wings of Insects.*

CYTOLOGY.—F. Payne, Indiana University, A Study of the Maturation Period in the American and European Molecrickets (Amer. Soc. Zool.).—Robert Chambers, Jr., Cincinnati University, Microdissection Studies on the Physical Properties and Behavior of Cell Structures, Especially in Orthopteran Spermatogenesis (Amer. Soc. Zool.).—Mary T. Harman, Kansas State Agricultural College, Spermatogenesis in Paratettix (Amer. Soc. Zool.).—D. H. Wenrich, Harvard University, Synapsis and the Individuality of the Chromosomes (Amer. Soc. Zool.).

PHYSIOLOGY.—George A. Dean and R. K. Nabours, Manhattan, Kans., A New Air Conditioning Apparatus (an illustrated description of the air conditioning machine and breeding chamber).—A. F. Conradi, Clemson College, S. C., The Moisture Factor in Relation to Insects (a brief presentation of the moisture temperature relation in insect activity).—N. E. McIndoo, Bureau of Entomology, The Reflex "Bleeding" of the Coccinellid Beetle, Epilachna borealis (Amer. Soc. Zool.); The Olfactory Sense of Coleoptera.*—V. E. Shelford, University of Illinois, Modification of Tiger-beetle Colors by Temperature and Moisture;* Modification of the Color Patterns of Cicindela by Temperature and Moisture.*—E. Newton Harvey, Princeton University, Studies on the Phosphorescent Substance of the Fire-fly (Amer. Soc. Zool.).—Wm. L. Dolley, Jr., Randolph Macon College, Reactions to Light in Vanessa antiopa, with Special Reference to Circus Movements (Amer. Soc. Zool.).

GENETICS.—E. Carleton MacDowell, Carnegie Institution, Bristle Inheritance in Drosophila (Amer. Soc. Zool.).—Robert K. Nabours, Kansas Agricultural College, The Behavior of a Unit Character in the Grouse Locust, Paratettix (Amer. Soc. Zool.).—A. Franklin Shull, University of Michigan, Parthenogenesis and Sex in Anthothrips verbasci (Amer. Soc. Zool.).—T. H. Morgan, A. H. Sturtevant, C. B. Bridges and H. Muller, Columbia University, Demonstration of the Four Hereditary Groups and the Four Pairs of Chromosomes of Drosophila (Amer. Soc. Zool.).

INSECTS INJURIOUS TO PLANTS.—C. G. Hewitt, Ottawa, Can., The Brown-tail Moth in Canada (the introduction and present status of the insect in Canada, with an account of the preventive and eradicative measures).—C. H. Hadley, Jr., Durham, N. H., Contact

Sprays for Brown-tail Caterpillars (result of spraying young brown-tail caterpillars in the spring with various contact sprays of different strengths).—E. A. McGregor, Batesburg, S. C., *Tenuipalpus bioculatus* McG., A Serious Pest to Privet Hedges (description of pest's work with notes on life history, habits and methods of control).—E. P. Felt, Albany, N. Y., Fumigation for the Box Leaf Miner (a summary of the effects of various fumigants upon both plant and insect).—V. I. Safro, Louisville, Ky., The Nicotine Sulphate-Bordeaux Combination.—P. J. Parrott and W. J. Schoene, Geneva, N. Y., Insecticidal Properties of Various Sulphides and Polysulphides (results of experiments with insecticides containing sulphides and polysulphides of sodium, potassium, calcium, and barium as regards effectiveness against various injurious insects).—W. M. Scott, Baltimore, Md., A New Contact Insecticide (results of experiments in the use of a dry barium sulphur compound as compared with lime-sulphur solution for the control of the San José scale and the oyster-shell scale).—J. W. McCulloch, Manhattan, Kans., Recent Results in the Use of Dust Sprays for Controlling the Corn-Ear Worm.—L. Haseman, Columbia, Mo., The Corn-Ear Worm and Its Control.—George A. Dean, Manhattan, Kans., Further Use of Poisoned Bran Mash Flavored with Fruit Juice for Controlling Insects (Effectiveness of this bait in controlling army worms invading fields and gardens; also in controlling variegated cutworms, black crickets, and grasshoppers).—E. P. Felt, Albany, N. Y., Grasshopper Control in New York State.—W. C. O'Kane, Durham, N. H., Arsenical Residues on Fruit and Grass (Summary of further experiments to determine the residues on fruit, foliage and grass after spraying with arsenate of lead, and the possible danger of poisoning human beings or livestock).—H. H. P. Severin and H. C. Severin, Marietta, Ohio, Kerosene Traps as a Means of Checking up the Effectiveness of a Poisoned Bait Spray to Control the Mediterranean Fruit-Fly (*Ceratitis capitata* Wied.) with a Record of Beneficial Insects Captured in the Kerosene.—L. Haseman, Columbia, Mo., The Work of the Cotton Worms and Moth in Missouri (Work of the pest on cotton and injury to fruit; also notes on development of the pest and control measures).—H. B. Scammell, Pemberton, N. J., The Cranberry Root Worm (History, distribution, life history and habits, with recommendations for control).—W. M. Scott, Baltimore, Md., Arsenate of Lime as an Insecticide (Report on the use of arsenate of lime as a substitute for arsenate of lead in the control of the codling moth and certain shade tree insects).—H. A. Surface, Harrisburg, Pa., Frauds, Semi-Frauds and Questionables (Brief discussion on the difficulties met by an economic zoologist in combating materials of more or less questionable value, recommended as insecticides).—W. W.

YOTHERS, Orlando, Fla., Spraying Scheme for the Control of Insect Pests (Approximate dates to spray to produce best results).—H. J. QUAYLE, Riverside, Cal., The Citricola Scale (*Coccus citricola*) (A summary account of the insect from the economic viewpoint).—P. J. PARROTT, Geneva, N. Y., An Analysis of Spraying Methods against the Codling Moth (Brief discussion of preliminary experiments on eastern and western methods of spraying and of some factors that should be considered in the employment of a driving spray in commercial apple orchards in New York).—E. G. TITUS, Logan, Utah, Apple Leaf Roller in Utah (Brief résumé of experimental work carried on against this insect during the present season).—GLENN W. HERRICK, Ithaca, N. Y., Further Data on the Control of the Fruit-Tree Leaf-Roller (*Archips argyrospila*).—P. W. GLENN, Urbana, Ill. The Apple Flea Weevil (*Orchestes canus*) (General account of occurrence in Illinois. Life history, habits and methods of control).—E. N. CORY, College Park, Md., Preliminary Report on the Woolly Aphis (Report of control measures investigated).—A. F. CONRADI, Clemson College, S. C., Results of Wire-Worm Investigations (Life history and control of the wire-worms, *Horistonotus uhleri* and *Monocrepidius vespertinus* in South Carolina).—WILMON NEWELL, College Station, Tex., Notes on Insects Attacking Sudan Grass (Information concerning well-known insects attacking Sudan grass, an important forage crop of the semi-arid Southwest).—S. J. HUNTER, Lawrence, Kans., Some Economic Results of the Year.—W. R. MCCONNELL, Hagerstown, Md., An Unique Type of Insect Injury (An account of an insect which prevents the proper functioning of the root-nodules of certain legumes).—C. L. METCALF, Columbus, Ohio, A Mechanical Measure for Controlling the Flea-Beetle (*Epitrix fuscula*) on Potato.—J. R. PARKER, Bozeman, Mont., An Outbreak of the Alfalfa Looper (*Autographa gamma californica* Speyer).—A. I. BOURNE, Notes on Onion Maggot in 1914 (Brief notes on work of present season's progress in the scout for practical methods of control).—H. H. P. SEVERIN and H. C. SEVERIN, Marietta, Ohio, Life History, Natural Enemies and the Poisoned Bait Spray as a Method of Control of the Imported Onion Fly (*Pegomya cepetorum* Meade), with Notes on Other Onion Pests.—E. G. TITUS, Logan, Utah, Insects of the Year in Utah (Principal insects causing damage this year noted on account of unusual character of some outbreaks).—C. W. CARPENTER, A Method of Excluding Mites from Pure Cultures (Amer. Phytopath. Soc.).—Also the following papers from the program of the American Association of Official Horticultural Inspectors (Section of Horticultural Inspection of the Association of Economic Entomologists): E. R. SASSCER, Fed. Hort. Board, Washington, D. C., Important Insect Pests Collected on Imported Nursery Stock in 1914.—H. B.

WEISS, New Brunswick, N. J., Some Recent Insect Importations into New Jersey.—Informal Discussion of Question 1. Should further importation of all nursery stock be prohibited by Federal law, except in very limited amount for experimental propagation by the U. S. Dept. of Agriculture?—Informal Discussion of Questions 2 and 3: 2. What is the proper treatment for scale-infested premises in close proximity to nurseries? 3. Should we require fumigation of all susceptible nursery stock grown in states known to be generally infested with San José scale?—A. W. MORRILL, Phoenix, Ariz. (a) Standardized Inspection Certificates, and (b) Should Living Plants be Excluded from the Mails? —L. HASEMAN, Columbia, Mo., The Missouri Inspection Service.—R. KENT BEATTIE, Fed. Hort. Board, Houston, Tex., The Training of a Nursery Inspector.—Informal Discussion of Questions 4 and 5: 4. By what means can the standard of efficiency of inspectors be raised? 5. Should horticultural inspectors furnish a bond?—T. J. HEADLEE, New Brunswick, N. J., Essentials in Insect Control (A plea for greater simplicity).—J. G. SANDERS, Madison, Wis., A Model Nursery and Orchard Inspection Law (Progress report), with General Discussion led by WM. PITKIN, Rochester, N. Y., Chairman of Committee on Legislation of the National Association of Nurserymen.

INSECTS INJURIOUS TO MAN.—T. J. HEADLEE, New Brunswick, N. J., The Problems Involved in the Practical Work of Controlling the Mosquito Pest within the Limits of a County (a brief statement of the problems and methods of meeting them. Based on two years' experience with such work).—R. A. COOLEY, Bozeman, Mont., A Review of the Spotted Fever Tick in Montana.—F. C. BISHOPP, Dallas, Texas, Flies which Cause Myiasis in Animals (Some aspects of the problem).—JAMES ZETEK, Entomologist, Republic Panama, The Ecology of Plague* .—SILER, J. F., GARRISON, P. E., and MACNEAL, W. J., New York, Recent Studies of Pellagra (Soc. Amer. Bacter.).

APICULTURE.—WILMON NEWELL, College Station, Tex., Address by the Chairman—Five-minute talks on apiary inspection work and foul brood situation in different states by apiary inspectors.—E. F. PHILLIPS, Washington, D. C., Distribution of American Foul Brood and European Foul Brood in the United States.—W. E. BRITTON, New Haven, Conn., A Simple Record System for Apiary Inspection.—BURTON F. GATES, Amherst, Mass., Inspection as a Unit in the Massachusetts Apicultural Service.

NEUROPTERA.—NATHAN BANKS, U. S. Bureau of Entomology, Geographical Distribution of Neuropteroid Insects, together with an Analysis of our Insect Fauna.*

COLEOPTERA.—A. G. RUGGLES, St. Paul, Minn., The Life History of Oberea ulmicola (?).

HYMENOPTERA.—J. W. MCCULLOCH, Manhattan, Kan., Further

Data on the Life Economy of the Chinch Bug Egg Parasite (Results of the life history studies of the past summer).—H. A. SURFACE, Harrisburg, Pa., Efficiency of Parasites of the San José Scale (An outline on the efficiency of parasites in cleaning up this pest; their natural spread in Pennsylvania, and their successful dissemination by artificial means).

LEPIDOPTERA.—C. P. GILLETTE, Colorado Agricultural College. Interpretation of the Codling Moth Data from Colorado.*—L. HASEMAN, University of Missouri, Life-history, Development, and Work of Unspotted Tentiform Leaf-miner of Apple.*—EDNA MOSHER, University of Illinois, Pupal Characters Used in the Classification of the Sphingidae.*—CORNELIA F. KEPHART, Cornell University, The Poison Glands of *Automeris io*, Fabr.*—PAUL S. WELCH, Kansas Agricultural College, The Biology of *Nymphula maculalis* Clemens.*

HEMIPTERA.—C. P. GILLETTE, Fort Collins, Col., Notes on Plant Lice having Alternate Food Habits; Food Habits of Some Colorado Aphids.*—R. A. COOLEY, Montana Agricultural College, A Photographic Record of the Development of the Female *Lepidosaphes ulmi* Linn.*—W. D. FUNKHOUSER, Ithaca High School, Notes on the Life-histories of certain Membracidae.*—H. OSBORN, Ohio State University, On the Life-histories of Cercopidae and Jassidae.*—MORTIMER D. LEONARD, Cornell University, Notes on Capsid Life-histories.*—C. R. CROSBY, Cornell University, An Insect Enemy of the Four-lined Leaf-bug.*—ANNA GRACE NEWELL, University of Illinois, The Homology of the Genitalia of *Benacus griseus*.*

DIPTERA.—J. M. ALDRICH, U. S. Bureau of Entomology, Results of Twenty-five Years Collecting in the Tachinidae;* The Habits of Sarcophagidae.—FREDERICK KNAB, U. S. National Museum, The Nemocera not a Natural Group of Diptera.*—ALVAH PETERSON, University of Illinois, Studies on the Morphology of the Head and Mouth-parts of Diptera.*

OBITUARY.

JOHN MUIR, the widely-known mountaineer and Californian naturalist, died suddenly of pneumonia, at the California Hospital, in Los Angeles, on December 24, 1914, at the age of nearly 77 years. His books, especially *The Mountains of California, Our National Parks, My First Summer in the Sierra,* will always be read and valued by the Californian naturalists. Two species of Lepidoptera were named in his honor by Henry Edwards in 1881; a pretty little noctuid moth, *Gyros muirii,* from Tuolumne County, and *Thecla muirii,* from Mendocino County. After describing the latter butterfly,

Henry Edwards says: "I have named this exquisite little species after my friend John Muir, so well known for his researches into the geology of the Sierra Nevada, who has frequently added rare and interesting species to my collection." A chapter on The Bee Pastures of California is of interest to the entomologist. Muir was President of the Sierra Club, Fellow of the A. A. A. S., and member of other societies.

Muir Lodge, in the San Gabriel Mountains, north of Los Angeles, is a memorial to him by the Southern California Section of the Sierra Club, which insect collectors will frequently pass in the years to come. With the late Joseph Le Conte, John Muir was known and loved by a larger number of people than any other Californian naturalist.

FORDYCE GRINNELL, JR.

WILLIAM WARREN, English Lepidopterist, known especially for his work on the Geometridae, died at Tring, October 18, 1914. He was born in Cambridge in 1839, subsequently graduated at the University there, taught at the Doncaster Grammar School and later "relinquished the calling of schoolmaster altogether and went in for Entomology pure and simple." He was a most active and vigorous field worker to the end of his life. A brief obituary notice in the *Entomologist's Monthly Magazine* for December, 1914, has supplied the above information.

DR. DANIEL ELMER SALMON died recently at Butte, Montana. He was born at Mount Olive, Morris County, New Jersey, July 23, 1850, and studied veterinary medicine at Cornell University. He entered the service of the U. S. Department of Agriculture in 1879 and was chief of the Bureau of Animal Industry 1884-1906. In 1907 he became director of the Government Veterinary School at Montevideo, Uruguay. He was joint author, with Dr. C. W. Stiles, of *Cattle Ticks (Ixodoidea) of the United States*, a work of 111 pages and 25 plates, published in the Annual Report of the Bureau of Animal Industry for 1902.

ERRATUM.

P. 28, this volume, "Table II", last figure in second column should be 3 instead of 6.

EXCHANGES.

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☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued

Wanted—Psyche, Vol. viii, No. 265 (May, 1898); No. 267 (July, 1898); No. 268 (August, 1898); Vol. ix, No. 300 (April, 1901). Address, giving price, Librarian, Stanford University, Cal.

For Exchange—Bred examples of *Abbottana clemataria, Empretia stimulea, Phobetron pithecium* and many other species of Lepidoptera from this locality, both Macros and Micros.—Fred. Marloff, Box 104, Oak Station P. O., Allegheny County, Pa.

For Exchange—Lepidoptera, Diptera, Coleoptera, Hymenoptera, Hemiptera and Homoptera to exchange with American or foreign collectors. Some foreign material on hand also.—Harry L. Johnson, South Meriden, Conn.

Exchange—Californian butterflies for those from other parts of North America. Also want *N. terlooi.*—Victor G. Duran, 937 South Kenmore Ave., Los Angeles, Calif.

Wanted—Entomological News, Vol. II, Nos. 6 and 10, to complete files.—Address W. E. Britton, Agr. Exp. Station, New Haven, Conn.

For Exchange—Pupae of *Amp. versicolor, Dolba hylaeus, S. geminatus, P. achemon* and others, also Noctuidae and Geometridae from this locality.—Ernst Frensch, Stonington, Conn.

Cicindelidae—Wanted Cicindelidae of North America and Mexico. Please send lists. Correspondence desired with collectors in all parts of the country.—Edwin E. Calder, Longmeadow, Rhode Island.

Ipidae (Scolytidae)—Will exchange for eastern, northern or southern species the Pacific Coast species *Dendroctonus brevicornis, monticolae, jeffreyi, valens, Ips confusus, oregoni, emarginatus, concinnus, latidens, Pityogenes carinulatus, Phloeosinus punctatus, cupressi, Hylurgops subcostulatus,* etc.—Ralph Hopping, 114 Sansome St., San Francisco, Cal.

American and Exotic Butterflies and Moths wanted in exchange for others. Please send exchange lists to Joseph H. Reading, 1456 North Rockwell St., Chicago.

I have eggs of Nebraska *Catocala*, perfect specimens of Missouri *Catocala*, Nebraska and Pacific Coast Lepidoptera and botanical specimens for exchange for certain rare U. S. Lepidoptera.—E. A. Dodge, 546 Bay St., Santa Cruz, Calif.

Diptera—Unnamed material wanted. Will collect other orders in exchange.—C. F. Adams, Atherton, Mo.

For Exchange—Illinois and Indiana Coleoptera, mostly Cicindelidae, Carabidae, Buprestidae, Cerambycidae and others, for North American species new to my collection.—C. Selinger, 1338 South 50th Avenue, Cicero, Ill.

Wanted—Transactions American Entomological Society, Vols. I, II, III and IV; Entomological News, Vol. II, Nos. 6 and 10; Vol. VIII, Nos. 1 and 6; Vol. IX, Nos. 1 and 2; Vol. X, No. 10; Vol. XI, Nos. 1, 3 and 5. Will purchase at reasonable prices.—Howard L. Clark, P. O. Box 1142, Providence, R. I.

Diptera—Wanted for cash or to borrow for study only, North American Leptidae (incl. *Coenomyidae* and *Xylophagidae*).—M. D. Leonard, Cornell University, Ithaca, N. Y.

Photographs of Entomologists Desired.

The Entomological Section of the Philadelphia Academy of Natural Sciences desires for its entomological album the photograph of every entomological student. The collection contains over 300 at this date. A list was published in the NEWS 1902, pages 45-47, of those in the album at that time. We hope that those who can do so will write their names and date of birth and the date when the photograph was taken on the back of each photo, along with any other information concerning themselves they may wish to impart.

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